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JOURNAL OF ELECTRICITY

VOL. 43. NO. 1.

SAN FRANCISCO, JULY 1, 1919

PER COPY, 25 CENTS

This novel display free —Write for it

Every merchant handling General Electric Type Appliances should have this beautiful copy of an oil painting in his window.

We say "copy"—but it takes a good eye to tell it from a real oil painting. As a sales help it stands in a class by itself.

It has character, originality, and a punch, that is not present in the average sales help that comes to you.

On canvas, 16³/₄ by 24¹/₂ inches, tacked on a wood stretcher, as though it had just come from the artist's brush.

It takes the eye. In a simple frame or set out with a pretty drape it will keep the walk in front of your window crowded.

The picture first appeared as a full page four color ad in the June issue of *Delineator*, *Designer* and *Woman's Magazine*. This copy in your window will immediately "tie-in" your store with our national advertising campaign.

The coupon to the right will do the trick. Fill it out, mail to us and we will see that you get your copy of this painting.

G-E DIVISION

Edison Electric Appliance Company, Inc.
CHICAGO

NEW YORK

ONTARIO, CALIF.

ATLANTA



A MORNING OF THE NEW ERA

Electricity—the silent, mighty and willing servant of mankind—swiftly carrying messages across land and sea, whirling the wheels of industry, stealing darkness from the night, is now engaged—like a modern Genius of Good—in bringing in a new era of domestic convenience.

EDISON ELECTRIC APPLIANCE CO., INC.
G.E. DIVISION



G-E DIVISION.
Edison Electric Appliance Co., Inc.,
5660 West Taylor Street, Chicago, Ill.

Date.....19....

Gentlemen:

I am a G-E Division Merchandiser and am interested in receiving your oil painting for my window display.

I have a good stock of G-E Type Appliances on hand or have ordered from my jobber, including.....
and plan to "tie-in" my store with your national advertising campaign.

Please send display to:

Name

Address

City..... State.....

Position..... My jobber is.....

Preliminary Injunction Granted!

Benjamin Plug Cluster Patent No. 759962



Distributors, Jobbers and Dealers are hereby notified that the Benjamin Two-Way Plug (Benjamin No. 92), an American device, manufactured by an American Company, is being infringed upon by a Japanese device, manufactured by a Japanese company.

A preliminary injunction has recently been granted by the United States District Court for the Northern District of California, at San Francisco, in a suit brought by the Benjamin Electric Mfg. Co. against Samuel Ran for infringement of the above patent.

A similar injunction was also recently granted by the United States District Court for the Western District of Washington, at Seattle, against R. M. Burton, for infringement of the same patent. The plug clusters marketed by Ran and Burton, and enjoined by the courts, were of Japanese manufacture.

The Benjamin Electric Mfg. Co. is the owner of Benjamin Patent No. 759962, and the Benjamin Company and its licensees (Harvey Hubbell, Inc., Bryant Electric Co., Ajax Electric Specialty Co.) are the only ones authorized to make and sell devices embodying the invention of the above patent.

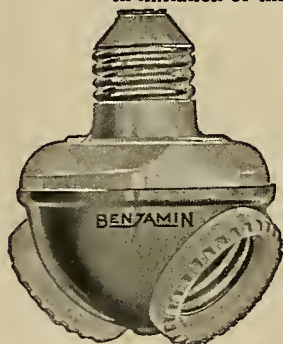
Infringers of the patent will be vigorously prosecuted.

The Two-Way Plug, made by the Benjamin Company, is known to the trade and public as Benjamin "92," as well as Benjamin Two-Way Plug.

In imitation of this, the Japanese devices have been marketed under the name "Benjamin No. 92"

or "No. 92." Dealers also should be sure that they are getting the genuine Benjamin Two-Way Plug. The Benjamin Company has branch houses at 247 W. 17th St., New York, and 590 Howard St., San Francisco, and the genuine article is handled by all electrical distributors and dealers.

In addition to the Benjamin Two-Way Plug, the Benjamin Electric Mfg. Co. has facilities for supplying high grade reflectors, industrial lighting fixtures, wiring devices and other electrical apparatus, enameled ware, castings, stampings and spinings in steel, all of which are made in America by skilled American workmen who receive America's standard of just compensation.



BENJAMIN ELECTRIC MFG. CO.

CHICAGO

NEW YORK SAN FRANCISCO

Benjamin Electric Mfg. Co. of Canada, Limited
Toronto, Canada

The Benjamin Electric, Limited
London, England



BENJAMIN

Makers of Things More Useful

JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

CLOTILDE GRUNSKY, Associate

VOLUME 43

SAN FRANCISCO, JULY 1, 1919

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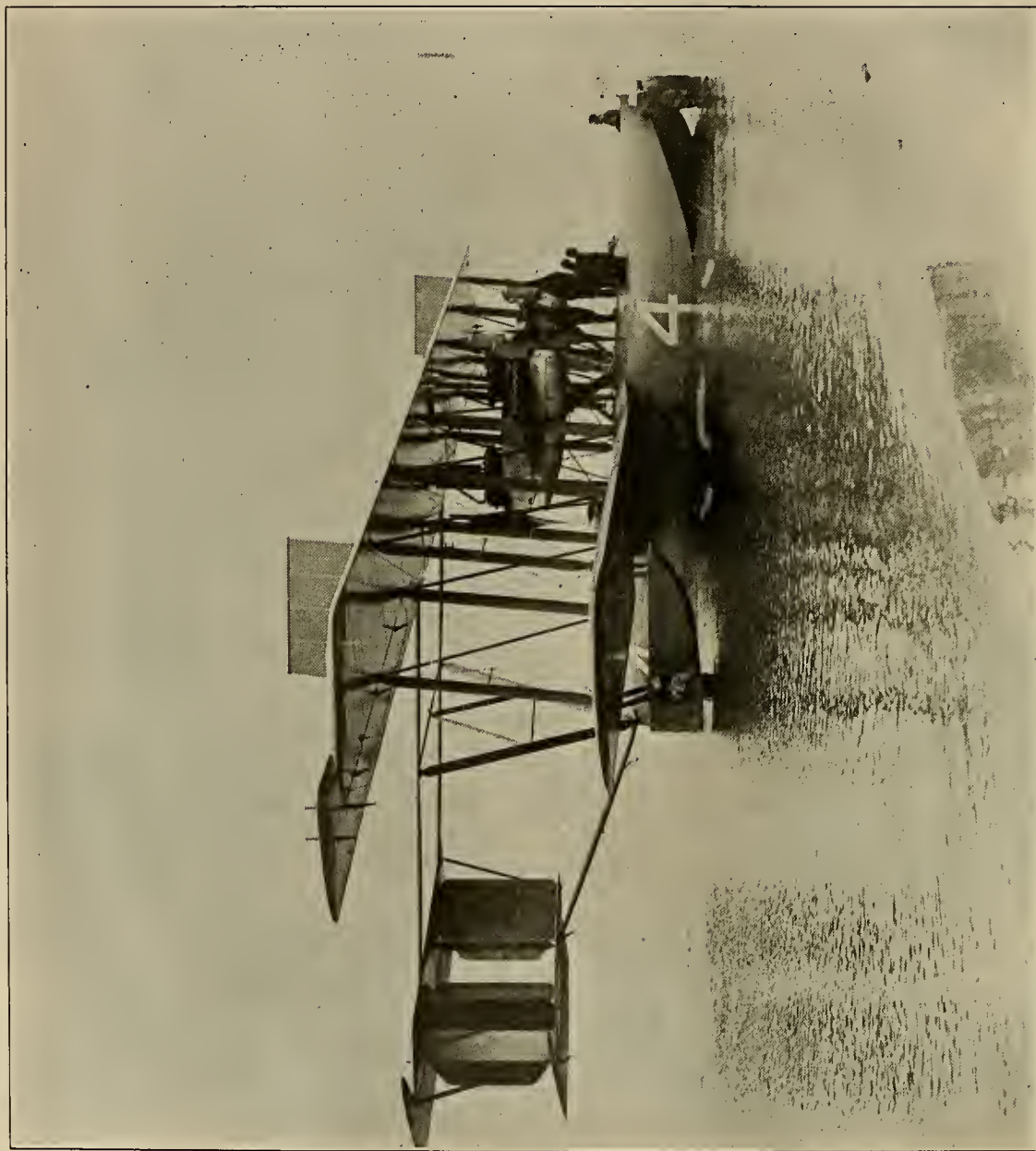
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Vice-President & Editor

ARTHUR H. HALLORAN
Secretary

R. J. DAVIS
Treasurer

Electricity Played its Part

in the crossing of the Atlantic by airplane.—Indeed, without the intercommunicating telephone system made possible by the invention of the anti-noise telephone transmitter, the flight of the NC-4 could not have been attempted. The roar caused by the propeller and the Liberty engines is so great that no human voice can be heard above it—and it would have been impossible for aviator and pilot to have held necessary communication with each other but for the invention of two San Francisco men, E. S. Pridham and P. L. Jensen of the Magnavox Company. By opening up the transmitter so that the noise of the engine reached both sides equally, while the voice impinged directly against one side and hence alone was transmitted, communication during flight was rendered a simple matter and, incidentally, the field of usefulness of the airplane greatly widened.





JOURNAL OF ELECTRICITY



DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43

SAN FRANCISCO, JULY 1, 1919

Number 1

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FRANKLIN K. LANE says: I would give to the man whom I wished to Americanize (after he had learned the language of this land) a knowledge of the physical America, so as to get an admiration, not only of its strength, of its resources, of what it could do against the world, but that he might have pride in this as a land of hope and land in which men have won out. I would take him across the continent. I would show him the 8,000,000 farms which went to feed Europe in her hour of need. I would take him out into Utah and show him that mountain of copper they are tearing down at the rate of 38,000 tons per day. I would take him to the highest dam in the world, in Idaho. And I would let him see the water come tumbling down and being transformed into power, and that power being used to pump water again that spread over the fields and made great gardens out of what 10 years ago was the dryest of deserts. . . . I would show him the struggle that we are making to improve the bad conditions. I would tell him not that America is perfect, that America is a finished country, but I would say to him, "America is an unfinished land. Its possibilities shall never end and your chance here and the chances of your children, shall always be in ratio to your zeal and ambition."

No one can say when we shall have reclaimed all our lands or found all our minerals or made all our people as happy as they might be. But out of our beneficent, political institutions, out of the warmth of our hearts, out of our yearning for higher intellectual accomplishment, there shall be ample space and means for the fulfillment of dreams, for further growth, for constant improvement. That is our ambition.

America, we dare believe, will ever remain unfinished.

Now that the Pacific Coast Section N. E. L. A. has gone on record, through its Public Policy Committee, of favoring the establishment of a Service Bureau to handle matters of publicity and information regarding various questions of utility life in the West, the question naturally arises as to whether these important matters under the guiding vision of the Public Policy

Committee can not best be handled through the Advisory Committee of the California Electrical Co-operative Campaign.

It would seem that, with the excellent personnel of this committee, here is a way of least additional outlay of money to handle in a most effective manner these new responsibilities.

The word cooperation not only signifies cooperation in matters of merchandising but indeed in every phase of human endeavor in connection with matters electrical in the West.

It is believed that here is a possibility for a new and even greater vision of mutual helpfulness never before thought possible of realization in the California Electrical Co-operative Campaign. The idea is a big one but the progressive West has ever proved herself equal to the occasion. The excellent results being attained by the Advisory Committee warrant the earnest consideration of the suggestion of turning over to its personnel the carrying out of the work evolved for public enlightenment by the Public Policy Committee.

Hitherto the Pacific Coast Section, N. E. L. A., has largely held its annual convention in separate rooms—one for the Engineering section and the other for the Commercial section. It is now generally recognized that the simultaneous holding of these sessions is quite undesirable as it prevents a certain breadth of discussion from being attained. The engineering phases of a commercial discussion as well as the commercial phases of an engineering discussion are both exceedingly desirable and without them the greatest good of timely discussion of this nature must fail of accomplishment.

It is greatly to be desired as a consequence that these sections continue their helpful investigations as in former years, but that the sessions be not made to conflict in their setting.

In order that the best results be accomplished, care should be taken prior to the annual sessions to see to it that these opposite phases of viewpoint be properly called to the attention of those in the engineering or commercial sections best able to give this breadth of view, in order that some thought and study might be given to the subject before the final meeting.

More and more men of the electrical industry are realizing that the channels of trade should remain unobstructed. As to whether the electrical manufacturer, the jobber, the contractor-dealer, or the central station undertake the actual merchandising of electrical ware it is of little consequence, for after all economic laws will at length adjust this matter to their full satisfaction.

Proper cost accounting will demonstrate these economic channels through which trade the better and more economically flows.

The first thing to do in all matters of a perplexing nature is to gather together all parties to the issue, and having gotten together, establish a code of ethics upon which transactions must be based. With firm adherence to principle when once established, little difficulty is to be anticipated. Such are the ideals of the great electrical cooperative movement that found its inception in the West and is today sweeping the nation with the force of their vitality.

The most recent idea of helpfulness to originate with the California Electrical Cooperative Campaign is the salesman auxiliary. Summed up, the new idea is designed to effect a method whereby the jobbers may be apprised as to what is going on.

It is now pretty well recognized that in spite of the written word, with its manifold ways of propagating information, the "word-of-mouth" method, old as the human race itself, is the safest and surest way to carry conviction to the person desired to reach.

The actual operation of the new scheme involves the appointing of committees in various centers of distribution among electrical salesmen who will advise themselves fully concerning the campaign and then as occasion arises pass the word to the trade in as emphatic and timely a manner as possible.

The new idea has a two-fold purpose; first, to pass to a group of wide-awake men the live features of the campaign, which in itself can not fail to bear fruit, and secondly, the making possible of a new channel of expression for the campaign in its effort to reach the trade as a whole. The idea is sound and it is believed splendid results are bound to accrue.

The question of good roads is very much to the fore in both state and national legislation. It is looked upon as a military and economic asset, and as a means as well of providing employment for returned soldiers.

In many respects it is a matter of great interest to the electrical industry. Good roads mean the development of new regions of the country, the encouragement of settlements in districts not yet opened and a consequent demand for electric service and electric equipment.

A further interesting development in the recent use of motor trucks for short haul deliveries in rural districts opens possibilities for the electric truck. The good roads in the vicinity of large cities have made it possible in many instances to adopt electric vehicles for parcel post deliveries in adjacent rural districts. This was probably the forerunner of the present movement. Not only is the truck being used for hauls to and from the railway, but for short distances as a substitute for the railway. One canning establishment goes so far as to pay 10 cents extra per box for motor delivery of fruit, finding that direct delivery eliminates losses through spoiling due to delay and to frequent rehandling necessary in rail transportation.

Many arguments are being advanced favoring the electrification of railways as a means toward conserving fuel and keeping in line with the march of progress. Two thousand acres of wheat recently destroyed by fire in Utah directly caused by the present method of steam operation, is another silent yet forceful argument that adds to the daily growing list of reasons why the method electrical will, from its added momentum as the days pass by, soon prove to all opposers irresistible in its onslaught.

It has been the practice of most large power companies to find employment for several college students each year during the summer vacation period. There is usually summer construction work to be done and the boys as a rule come recommended from professors or other engineers known to the men in charge.

This is all more or less casual in present practice, but holds the possibility of real service if carried out on a more consistent basis. Every public utility is on the lookout for promising material—it is usually worth actual money to them to know the two or three best possibilities in a class of graduating engineers. The best way to secure this information is at first hand. By making a definite policy of employing well recommended college boys with a view to later taking them into their organization on a permanent basis, the company not only attracts men of an ambitious calibre, and has an opportunity to see what the available material is worth, but has a chance as well to interest just the men it chooses in its organization and in some measure to influence their preparation along the lines most suited to their future employment. The college is, of course, not the only source of available material, but it is one of the most fruitful, and the usual criticism of college boys that it takes some months for them to become adjusted to conditions of actual work, could largely be eliminated by letting them pass through this period during the time of training in the college vacations. It is the best proof of the health and vigor of any organization that it attracts to it the best brains and enterprise of each generation as it comes along.

A recent conversation brought to light the fact that there are to be found business men who subscribe to a commendable number of technical magazines covering their trade, who yet fail to remove the wrappings of these magazines when they arrive. The justification offered is that the successful business man, be he engineer or merchant, by the very nature of his success has no time for reading.

Why Read Your Technical Magazine

And yet you will find that the most successful business man is the one who does keep in touch with the advances of his trade or profession, who knows what new methods have been recently worked out, what problems are interesting his fellows, what experiments are being tried. The doctor must keep in touch with progress in his profession or he is very soon branded an "old foggy"—no less must the engineer follow the advances in construction and theory, the merchant the up-to-date practices of other parts of the country, the plans for nationwide campaigns and up-to-the-minute practice in merchandising. The technical magazine is the best source of this information. Books on other than fundamental subjects are in some measure out of date before they are published—to depend on personal contact and gossip for keeping in touch with your world is to revert to the middle ages or the interior of illiterate Russia in the scale of progress.

The subscription to a magazine is an expenditure for which a return is expected. The technical magazine expends its fullest energies to make that return. It has established avenues of connection not open to individuals through which it keeps in touch with advances as they occur, it studies the problems which become apparent through this close contact—it endeavors to meet them and to offer just that news, those statistics, this solution which its readers most need. Not to take advantage of this service is to disconnect your telephone after paying your bill; is to hire a clerk and then keep him with hands folded while you work overtime.

A most lucid analysis of present price conditions has been made by the Division of Public Works of the Department of Labor, preparatory to the encouragement of general construction activity.

Why Prices are not Going Down

As they point out, most people believed that the high level of prices reached during the war was caused merely by the extraordinary demand for commodities which exceeded the supply. It was also commonly believed that the industrial capacity of the world had been greatly expanded

under the stimulation of war orders, and that this expansion would bring sharp competition between rival concerns in time of peace. Furthermore, it was thought that there would be after the war great armies of unemployed workmen, who would be compelled by necessity to accept work at low wages; that there would be sharp competition among the leading nations in international trade; and that buyers generally, looking forward toward an era of lower prices, would postpone buying. In the light of these considerations it was but natural for people to expect a great fall in prices, and even to fear an industrial panic.

However, the expected great fall in prices has not occurred, and it is not likely to occur for the following reasons:

1. The rise in prices during the war was not merely the result of a great demand for goods and of a scarcity of certain goods. It was largely brought about by means of inflation of the currency by the governments at war and by the neutrals, either by the direct issue of paper money or by the issue of bonds. Although war orders are now largely a thing of the past, the extension of credits still exists as a continuing cause of high prices. There is little to indicate an early contraction of credits.

2. World production in general during the war, contrary to a widely held view, was not abnormally large, but the abnormal consumption of certain goods for war purposes has depleted the stocks of commodities of the world.

3. Armies of unemployed, in the United States at least, have not materialized, and an actual labor shortage is in prospect.

4. Buyers since the armistice, although showing a desire to wait for lower prices, have been compelled to buy to meet their daily needs. During the war, because of scarcity of commodities and high prices or because of patriotic self-denial, they did not buy in advance of need, as is customary in an era of rising prices. Consumers' goods are in great demand and retail trade is now moving in great volume.

5. If the production capacity of industry should be greatly increased, lower prices would not necessarily follow. If there is a strong enough demand for commodities, prices need not fall, no matter in how large volume commodities are produced. There is every reason for expecting such a strong demand. The world is now suffering from a great shortage of durable goods—buildings, transportation facilities, and industrial equipment. Furthermore people, both in the United States and Europe, have a stronger desire for consumers' goods than ever before. This is true partly because of the scarcity of certain goods during the war period, and partly because of the new experiences through which tens of millions have passed, which have awakened in them desires for goods and services they never enjoyed before. Along with greater production of goods there is likely to go further extension of credits rather than contraction. Neither the credit system of the United States nor that of the world has reached the limits of its power of expansion.

Business men of the United States, therefore, need not hesitate to plan for an immediate period of business prosperity. No period of depression and no collapse of values need to be feared. The man who goes full speed ahead will gain an advantage over his procrastinating competitor which will far outweigh any possible slight decline in costs of production.

NEW JOURNAL SERVICE: An authoritative discussion on the "Adaptation of the National Electrical Safety Code to Western Conditions" by Geo. E. Quinan is to be the feature of the July 15th "Engineers' Number" of the Journal of Electricity. The work and plans of Western engineering societies, a discussion of the status of railway electrification in the West, the future of the merchant marine and other problems of present day interest will be presented. A comprehensive report will be made on merchandising problems as discussed at the Santa Cruz convention of the California Association of Electrical Contractor-Dealers.

The index for Vol. 42, January to June, 1919, is now ready and will be mailed to any subscriber for binding upon request.

Attention is called to the fact that the "Latest in Everything Electrical" department of the Journal of Electricity is open to any new appliances or apparatus placed on the market. All contributions must be written purely from the standpoint of news matter, without advertising intent—and are subject to editorial revision and selection.

Electricity at Summer Conference Grounds

(The field for electrical appliances in the West is not confined to city hotels, but extends as well to summer camps and outdoor resorts. The electrical equipment at the Y. W. C. A. conference grounds at Asilomar here described is unique in many respects and suggests possibilities of a wider use of electricity along similar lines elsewhere.—The Editor.)

Extensive installations of electrical conveniences are usually associated with cities and with hotels and homes of luxurious appointment. In the West, however, where the greater distances of the country, combined with a willingness on the part of the



THE ADMINISTRATION BUILDING

Electricity is used wherever possible, as other fuels are scarce. The Y. W. C. A. was fortunate in securing Miss Julia Morgan as architect.

inhabitants to depart from railway connections, even to some distance, make fuel transportation a difficult problem, electricity is found in extensive use in camps and summer outing spots. Wood is scarce and unsatisfactory for use on a large scale, coal is difficult to transport and very high, gas is out of the question in remote spots—and the only remaining fuels are oil and electricity. Both are used, but the great convenience of electricity for illumination, cooking and general power purposes, as well as the general acceptance of its use in this region of hydro-electric development, have led to its wide application.

A Pacific Conference Ground

One of the most interesting of these camp-hotel installations is that of the Asilomar conference

grounds, conducted by the Y. W. C. A. near Monterey, California. This unique institution is the only privately owned center for conferences on the Pacific Coast—and the first of its kind anywhere under the management of the Y. W. C. A. It was started as a meeting place for college girls and the association conferences, but has been extended to serve as a general conference grounds, open to any association, either men or women. As many as eleven conferences were held there during one year. The Y. W. C. A. retains the management of buildings and dining service and merely rents hotel and camp accommodations together with use of the grounds to any applying group.

Extensive Use of Electricity

The accommodations consist of an administration building and large meeting hall, a chapel, a lodge with steam heat and hotel comforts, a second building not steam heated and eleven tent houses, providing for 32 guests each, besides the dining room, kitchen, rooms and laundry for the girls who do the work, garage, hospital and such auxiliary buildings. These are all lighted by electricity, furnished from the Del Monte power plant located on the hotel grounds at Del Monte, Cal.



THE DINING HALL

All food is cooked by an electrically operated fuel oil range, all dishes washed by electric dish washers. An electric dough mixer, mayonnaise mixer and a toaster complete the equipment, but more is contemplated.



Forty thousand dollars were to have been spent on permanent improvements within fifteen years, according to the original agreement with the Pacific Improvement Company. Within the first five, over two hundred thousand have already been invested. Part of this was put into the electric pump and other equipment described in this article. The plan of the grounds is that of scattered buildings. Paths between are electrically lighted.



The Administration Buildings

The administration building is the headquarters of the establishment and contains a meeting room capable of accommodating from five to six hundred, a news stand and candy shop, and lounging room facilities. The building is most attractive, of the rustic bungalow type, and is electric lighted throughout. Originally the fixtures were improvised from abalone shells appropriate to the Monterey region, but it was found that these did not give sufficient light—and simple indirect fixtures were substituted. The candy shop specializes in home made candies, which are made, most of them, on a small electric grill in a back room.

The simple chapel, with its wonderful outlook on the ocean, is one of the features of Asilomar. It is finished in soft redwood with dull blue hangings and the whole end of the building behind the pulpit stand is in the form of an enormous window overlooking the rocky coast. The audience has always this view before them, and with all the comforts of an interior auditorium, quite gains the effect of being out of doors. The lighting of this building is also of the simple semi-indirect type, but holds a particular beauty in the reflections of the light from the pine trees out of doors at night.

The location as well as the picturesque buildings go to make Asilomar unique. And this "Retreat-by-the-Sea" is not picturesque at the expense of comfort—but is provided with a most complete electrical equipment for the convenience of guests and employes.

The camp provides accommodations for over 500, mainly in tent houses as here shown. These are electrically lighted, and water for other purposes than drinking and washing is electrically pumped on the premises. The outfitting of these grounds was made possible largely through the generosity of the late Mrs. Phoebe Hearst, who took a great interest in the Y. W. C. A. during her lifetime.

Lodge and Tent Accommodations

For the convenience of guests and older persons who would not be comfortable in tent quarters, hotel conveniences are provided. These have steam heated rooms, heated by an oil furnace electrically operated, and other comforts of the usual hotel. More simple accommodations, but still indoors, are open to those who do not care for tents. The main sleeping quarters are the tent houses, however, each providing rooms for thirty-two. These are in the form of double rows of tent rooms with a corridor and verandas on either side, on which the beds are usually arrayed at night. These also are electrically lighted, a feature not only of great convenience, but of safety as well. A small hospital is provided in case of emergency, pleasantly located and well fitted out. The lighting and a small sterilizer for surgical instruments, electrically operated, make up the electrical equipment here.

The Stuck-Ups

Service is furnished by college girls in the employ of the Y. W. C. A. To care for this "help" a special institution of "Stuck-ups" has been inaugurated. The privilege of this employment is highly prized, so much so that it has been found necessary



to limit it to one year. Girls are drawn from as many colleges as possible, particularly from among those who are earning their own way—and no girl is permitted to serve more than one season. They call themselves the "Stuck-ups" and have a little chorus which is given on occasion, to the effect that, being stuck-up, they stick together. Their quarters are called Stuck-up Inn, and are provided with the same facilities as elsewhere. In addition the girls have a laundry for their own use where they are permitted the use of electric irons. These make possible the starchy cleanliness of their appearance in the dining room.

Electricity in the Kitchen

The main use of electricity, of course, is in the dining room and kitchen department. Oil is used for fuel in the burners of the range and bake oven, which are electrically operated. This is true also of the steam table and coffee urn which use steam from the central heating plant, utilizing oil for fuel with electric motive power. There is further a large dough mixer, a mayonnaise mixer for eggs and sauces, an electric dish washer which gives great satisfaction in use, and an electrically operated potato peeler. Electric toasters are used with excellent results. An idea of the capacity of the kitchen facilities is to be gained from the fact that 580 guests have been entertained at dinner at one time.

Saw Mill and Pumps

One of the features of the evening at Asilomar is the great bonfire, which is much enjoyed for its own beauty and for the jolly program which is always arranged. This is made possible through the use of an electric saw which readily handles the wood and subdivides it into logs of a convenient size for handling. With so many women employees it becomes necessary to have most of the heavy work handled by machinery—a method which has proved both satisfactory and, in comparison with other possibilities, economical.

There is a well on the place which supplies water suitable for other uses than drinking. A turbine

pump attached to this source of supply keeps two tanks filled and provides water for all irrigating, flushing and like services. Drinking water is piped in from the general peninsula water supply.

Additions Planned

The installation is one of the most extensive on this coast—and is not yet complete. With the growing scarcity of wood and the high prices of fuel oil, the camp management is looking to electricity to play a still greater part in the camp and plans for extensions are already under way.

ELECTRIC FISH SCREEN USED TO KEEP FISH OUT OF IRRIGATION CANALS

An electric fish screen, designed to prevent the immense loss of fish through irrigation canals, said to run as high as 40 per cent annually of the fish supply in certain streams, has been in operation at the Utah State Fish Hatchery at Murray for some time, with good success.

The screen is the invention of H. T. Burkey of Tulsa, Oklahoma, and is so arranged that currents of varying voltage and amperage are passed through the water at the head of the irrigation canals. The strength of the current is graduated, so that the smaller fish, coming down the canal from the river, will meet with a current that is designed to send him skeltering back to safety and the river. A larger fish might not be affected by a current of that strength, but proceeding down farther will meet a current that will cause him to reverse propellers instantly. If the smaller fish were to encounter the stronger current he might be stunned, and float on down the canal and past the screen.

It is claimed that approximately 95% of the fish will be prevented from entering the irrigation canals by the use of this device.

AN ENTERPRISING RETAIL STORE is that of the Levy Electric Company of San Francisco. Mr. Levy makes a specialty of residence district trade and his motto is Service. Note the bin arrangement in the counter display and the compact storage of stock. Lamps form the backbone of the dealer's trade and advantage is taken of this by frankly tying-in with national advertising, both in the Mazda girl at the left who stands directly before the open door, and in the carton display over the shelves.





The Thomas Ince Studio at night, showing one use of electricity in motion picture making.

Electricity in the Making of Moving Pictures

BY CARL M. HEINTZ

(The moving picture on the screen is familiar to all of us but the moving picture in the making is something different. The methods of conducting a moving picture studio, the elaborate equipment which goes to the production of a modern film, and the part which electricity plays in the scheme, are interestingly illustrated by this account of some of the well-known studios of Southern California. The author is connected with the Promotion Division of the Westinghouse Electric & Manufacturing Company, Los Angeles.—The Editor.)

A tourist was driving through Southern California, observing the different points of interest, when he passed a beautiful colonial structure surrounded by a magnificent lawn with big trees. He stopped the guide and asked, "What Country Club is this?"

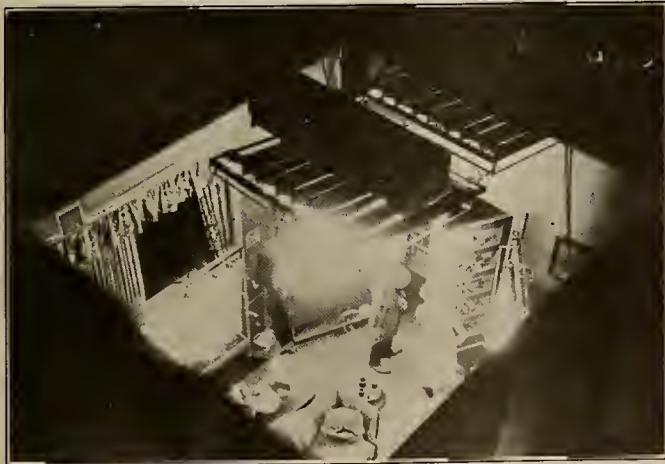
This is only characteristic of the motion picture studios of today. There has practically been no limit

of production for the local motion picture industry for the past year amounted to some \$160,000,000. The noted stars in these productions received a total of approximately \$18,000,000 during the past year. This does not include the great number of "extras" employed for practically every picture.

A Modern Studio —

In and around Los Angeles are situated forty-six motion picture studios. Of course this includes large and small, some covering only an acre, while others cover several hundred acres.

The new Goldwyn Studios, which are among the most up to date of the studios in Southern California, were erected at a cost of over \$1,000,000. The studio covers thirty acres adjoining the main building. Five complete glassed-in stages are inside the studio, and each of these stages is large enough to accommodate five companies at one time. However,

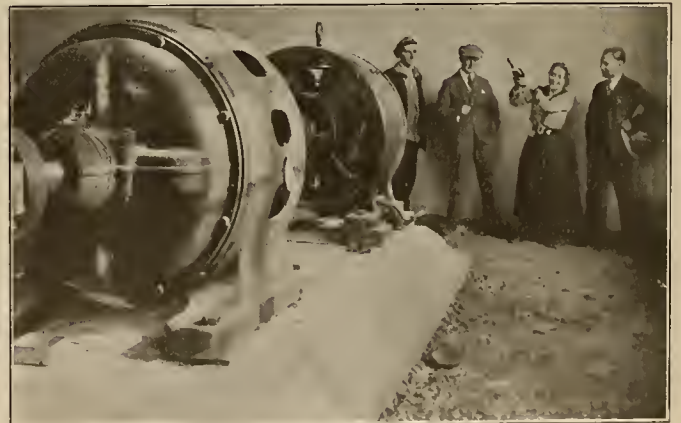


As a setting looks from above. Banks of mercury vapor lamps give the proper spread of light and then highlights are secured by the use of arc lamps.

to the expenditures put forth to beautify the studios and make them an asset both artistically and commercially to the community.

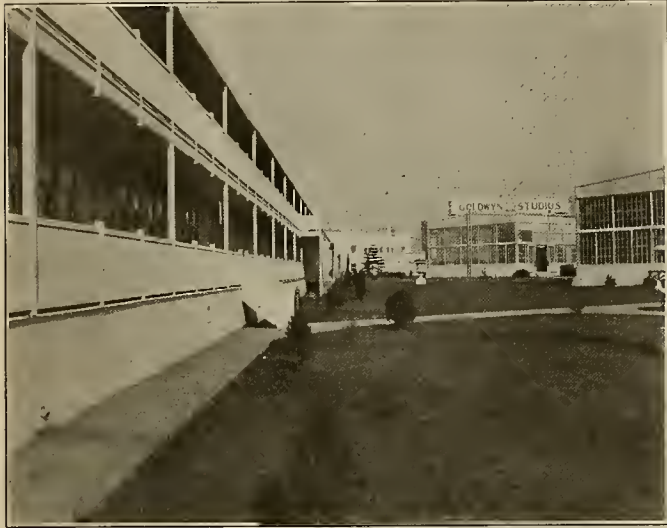
Growth of the Motion Picture Industry —

The motion picture industry has grown from its infancy, six years ago, to the place of the third largest industry of the United States and is fast becoming the largest and most important industry of California. As nearly as can be estimated the total cost



Bessie Barriscale of the Brunton Studios christening their new Westinghouse motor generator set. Later Miss Barriscale's name was painted on the base. From left to right: Walter Strohm, chief electrician, Robert Brunton, studio manager, Miss Barriscale and Mike O'Levee, author.

it is very seldom that more than one company works on the stage at one time. It is customary for the director, before starting to "shoot" a picture, to have as many different settings as he will require for the day set upon one stage and then "shoot" one scene right after the other, thereby saving a great deal of time.



The Goldwyn Studio, which covers thirty acres. There are five glassed-in stages as well as some ten more out of doors.

Besides these five glassed-in stages the Goldwyn Studios have an out-of-doors stage which will hold ten separate companies or ten settings at one time. This stage is used for mob scenes, race track pictures, and so forth.

Every comfort is supplied to the employees, who number 450 without counting the film stars. This number includes the office force, carpenters (of which there are a great number), stage hands, electricians, etc. There are two hundred dressing rooms, equipped with all the latest conveniences, at the disposal of the actors. A complete library, barber shop, soda fountain, restaurant, laundry, infirmary, telegraph office, tailor shop and dressmaking establishment are maintained for the benefit of all employees, actors and actresses by the Goldwyn Studios.

A Complete City —

Universal City is another show studio of the West. Its studio of 360 acres provides wonderful settings for the famous Western Pictures which it produces. A complete zoo is maintained by this studio containing animals of every description from the four corners of the earth. From fifteen to twenty separate producing companies are steadily at work in the studio, and last year 500 complete motion pictures were turned out. Universal City maintains its own fire department, garage, pumping plant, restaurant and general store, and is a complete city in itself.

Electricity in the Movies —

Electricity has played no little part in this great industry, working its way into every phase of the motion picture work. The principal use of electricity is for the stage lighting.

In general, stage lighting is a combination of what is called "hard" and "soft" light. The Cooper

Hewitt mercury vapor lamp, which is very largely used, possesses the actinic qualities that make it excellent for this work. The Cooper Hewitt is a soft light, and in order to bring out the high lights in a picture or to emphasize contrasts, arc lights are employed. These arc lamps, which throw off a "hard" light, are very generously used and consume a considerable amount of current.

It is generally known that an arc lamp operates better on d.c. than a.c. When operating on a.c. it changes its intensity of illumination slightly with



May Allison, noted film star of the Metro Studio, turning the spotlight on a setting. For the general illumination the "soft light" of Cooper-Hewitt lamps is used.

every alternation, and since it is possible for this to synchronize with the shutter operating on the camera one can readily see why d.c. is more satisfactory for stage lighting.

The Electrical Equipment of a Studio —

It might be interesting to briefly outline the electrical equipment at some of the studios. At the Metro Studio, for instance, the Southern California Edison Company's incoming high voltage line of 15,000 is stepped down in a bank of 3—250 kva. transformers to 2200 volts. They also have another bank of 3—100 kva. transformers stepping down from 2200 volts to 110 volts, 3 phase. These supply the stage lighting circuits, the a.c. lights being mostly used for overhead lighting.

Mr. Walter Grams, chief electrician at this studio, is employing a very novel scheme to secure constant voltage regulation on his a.c. lighting circuits. It is most desirable to maintain a constant voltage regulation for two reasons—one that it produces better photography, the other that it increases the life of the Cooper Hewitt lamps. The Metro Studio has installed a 3 phase, 60 kva., 2200 volt induction regulator, which controls the bank of 3—100 kva. transformers on the lighting circuit. Then when the director calls for the lights and a very few seconds later calls for the camera to "shoot," the regulator has compensated for the additional load, which amounts to a great deal on large settings. The voltage under this arrangement never varies over a volt and a half at the point of distribution. The d.c. current for stage lighting is supplied by a 300 kw., 115-230 volt motor-generator set and 1—100 kw. motor-generator set.

Dave Barnett, chief electrician of the Clunes New Studio, has planned a novel installation. The

power house consists of a motor generator and transformer rooms. A 350 kva. transformer steps down the incoming line to 2200 volts and at present they have in operation a 75 kw. 3 unit motor-generator set and have on order a similar set with a capacity of 150 kw.

Thomas Ince's beautiful new studio is somewhat unique in its electrical equipment. Mr. Reeve Houck has installed a 250 kw. rotary converter. The fact

that this rotary converter operates so well under the widely fluctuating load is due in large measure to the fact that the voltage circuit supplying this studio is controlled by an induction regulator.

Besides using electricity for stage lighting, the studios use a great deal in their carpenter shops, laboratories, projector rooms, etc. Practically all the electricity used by the studios is supplied by the Southern California Edison Company.

Choosing and Training the Man for the High Position

BY T. JULIAN MCGILL

(With the industrial unrest of the present, it behooves the employer to give special attention to the choice and training of the men who are to lead his organization. Do you grow your own managers—or let some one else train them for you? The Chicago district manager of the Westinghouse Electric & Manufacturing Company believes in a proper training within the company. The following article formed part of what he had to say on the subject at the recent convention of Westinghouse Agent-Jobbers at Del Monte.—The Editor.)

The practice of corporations securing their brains through training by others, is incompatible with the principles of political economy, for a corporation that depends upon others for its men is guilty of commercial piracy, as its own gain is at the loss of others, who have a material financial investment in their men. It should be the duty of a corporation to expend sufficient sums to select and train men for their own needs, and allow adequate compensation to maintain their organizations up to the standards necessary.

Adequate Compensation —

This compensation should be sufficient for the average men to live in accordance with the standards compatible with the corporation's demands and to raise and educate their families to an equal standard. If this is not afforded, then the belittling self-consciousness of the man, that he is unable to rear and educate his family to his own level, works havoc with his contentment and too often with his loyalty. It is difficult to give a name to this psychological fact, but perhaps "Educational Unrest" defines it. It must be recognized, and the standard demanded by the corporations of its men should not be on a higher level than the opportunities afforded.

Furthermore, this obligation of just compensation should not be lessened due to the agreeableness of the employment with its incident increase in the available supply of applicants.

In considering the problem of just remuneration, corporations must recognize that present day efficiency methods demand that men must devote all their abilities and energies to their company's affairs, precluding the opportunity of other financial return than ultra-conservative investment of their savings.

New Ideas Grown as Well as Imported —

The statement that interchange of men alone brings new ideas into the company and thereby insures its progress does not justify the injury done to other companies supplying such men, and is disproven by those corporations earnestly endeavoring to train their own men. It is also doubtful that men in general have progressed due to this opportunity to

take positions with others. Such positions are experimental and unless the opportunities are unusual, both men and business economics would make greater progress by having men continue to work with conditions under which they have been a proven success.

In most cases, men seek employment with others because they honestly feel their remuneration is less than their efforts and their results justify. This could be rectified by corporations recognizing the obligation through salary, profit sharing and pensions plans to compensate their men in accordance with their actual earning capacity, rather than giving a salary on the basis of replacement. Most men are loyal to their Company and to their stockholders and are willing to secure pay in accordance with their Company's financial status, but it is demoralizing when continually corporations largely through the continued and efficient efforts of their men reach a financial condition of affluence, only to use their excess earnings for the benefit of stockholders. This policy can only be construed as an effort to secure the plaudits of investors rather than to perpetuate the success and loyalty of their employees.

Essential Rules in Training Men —

There are no definite and exact rules governing the successful training of men, but the following are essential:

- First—Correct organization under which men can work understandingly and have opportunity for continued development and advancement.
- Second—Personal observation. Training to be effective must be fitted to the men individually, which must be accomplished by personal contact with the men.
- Third—"Red Blood" in the Boss, which appeals to the worth-while elements in the character of the men. This is especially true with young men, and if the training has a well balanced sympathy and understanding of youth's viewpoint, a permanent development can be obtained.
- Fourth—A financial remuneration justly based upon the man's earning power for the Company.

The Actual Loss in a Turnover —

A large amount of capital is invested in the men, which is dissipated upon men leaving the service. In an analysis made covering salesmen and sales

managers over a period of 15 years, of the men leaving, which varied from 10% to 25% per year, 90% left within five years of their initial employment. This record was as follows:

Within the	first year	25%
" "	second "	31%
" "	third "	23%
" "	fourth "	12%
" "	fifth "	9%

This record showed to keep men for three years, reasonably insured a continuation with the Company. No doubt improper selection had much to do with the loss of men in the first and second years, which emphasizes the necessity of proper selection.

To these men who left, the corporation had paid in Salary and Traveling Expenses without any Overheads, the sum of \$800,000.

Obviously no precise formula can be evolved for determining how much of this \$800,000 was actually expended in training these men, which training was obligatory again with the new man, but for this highly trained class of employe it probably was \$2500 or more per man, as the average salary and expense was \$10,000 per man for the entire period of his employment, which with overhead added would probably be \$20,000 per man. While the turnover and the numbers affected is less than with the wage earner, the training expense is very much higher and warrants the most serious consideration of all means for betterment.

Training to Blame for Failures —

Eliminating the men who have tendencies obviously unsuited for the particular business under consideration, it is well to reckon that the balance have sufficient qualifications, if the training can be made adequate for bringing out these qualifications. Few men acknowledge that men subordinate to them are failures due to the system under which they are required to work, and that others are successful in spite of such conditions. While the training cannot be made to develop efficiently every man alike, and often individual characteristics interfere with its efficiency, it is a just statement that when men are not being developed, who have had proper selection, it is due to weakness in the system, and not the men.

A number of business men are too penurious, and others too impatient to grow men. Their system fosters changing of men until they can get men who do passable work without requiring of the employer arduous supervision and training. Such methods necessarily produce mediocre men, and the company's standard must be lowered to meet the deficiencies of the men working under it.

The Principle of Advancement —

One of the greatest obstacles preventing successful training is for men, who are not developers, through the vagaries of chance, to reach positions with authority over others. This strangles growth and promotion from below, and is, therefore, a "blind alley" in the organization, which causes the loss of the best of the men subordinate to such men, and usually the overpaying for the job due to longevity in service. When promoting men over others, choose only men whose accomplishments insure their ability

to grow and develop those subordinate to them. Recognize faithful service in men without this accomplishment by some other reward than giving them authority over other men.

Selecting the Proper Man —

As to the selection of young men or others without sufficient business experience to have demonstrated their qualifications, this must depend upon visible characteristics or qualifications as shown in school or college life, or in some unimportant business trial. Obviously this is somewhat problematical, as it is too involved for exact predetermination. In fact, there are no visible rudiments of character yet understood that are a precise pilot to the ultimate worth and adaptability of the individual. Present tests to ascertain mental and moral sufficiency or business aptitude prove only irrational contradictions. Therefore, the training must be adequate to develop the average individual up to the standard of effectiveness desired, as we must accept the necessity of choosing from that large class of men who have only normal abilities.

As to the selection of older men having experience and proven ability, too many are allowed to fail in the new position because of seeming inability to adapt themselves to their changed environments. It must be appreciated that these men are not so pliable as the young beginner, and therefore careful consideration must be given to the suitability of such men for the specific work to be done. "Teaching an old dog new tricks" is not insurmountable in business, but superior effort is demanded to shape men brought up under other training to your own organization.

Help Develop the Man Under You —

This subject of selecting and training men demands continuous consideration. All should give serious thought to the ways and means of helping the fellows below to develop. Do not suspect them or repress their initiative by ill-considered rebuffs, but help them to be one of the few who accomplish the things worth while. The upbuilding of men should be the greatest reward offered by a successful business career.

Finally, the Corporations must appreciate that few men can grow to be greater than their Company's estimate of their worth, and a belittling act by the Company should never be exercised without due consideration of the consequence to the man.

Also, Corporations should demand that their business be conducted with precise regard for the authorities invested by their organizations, so the effort of all will be well ordered and coordinated. This should be inviolable. Short circuiting the responsible man, either from above or below, is repugnant to the permanency of good organization, and without good organization, successful training and development of men cannot be accomplished.

It is essential that employes have an enthusiastic fealty for their organization. This spirit is probable only where the executives have a like loyalty and a studied effort to inculcate this feeling in their subordinates.

The Electric Fan and the Summer Sale

(With the midsummer months comes renewed interest in anything which can relieve the oppressiveness of extreme heat. The possibilities of the electric fan are legion, but hot weather is its golden opportunity. The Robbins and Myers Company of Springfield, Ohio, is responsible for the data in this article, which shows the right time, the right place and the right way to dispose of electric fans.—The Editor.)

The electric fan is an article which can be used the year around for many services other than the services for which it was originally developed, and the public is gradually learning more and more to use the fan at all seasons. As an aid to uniform heat distribution in winter it is almost as valuable as it is to prevent discomfort from the heat in summer. It can be used for drying clothes, photographic plates, vegetables, etc.; for driving steam and odors from the kitchen, refrigerator, closets, etc.; for keeping the frost from show windows, and dozens of other services which make it an article of year-around utility.

The Hot-Weather Opportunity —

From a sales angle, however, the fan is still a seasonable proposition, and can be sold to the best advantage during the one or two hot months of the year only. After the purchaser has obtained his fan he will use it for many of the extra services for which it is suitable, but in ninety-nine cases out of a hundred the appeal which makes the sale and the only one which will do so is the hot weather comfort appeal, and, curiously enough, this appeal is effective only right at the time when the prospect is actually experiencing the discomfort of hot weather.

The heat of one day is forgotten the next, provided a cool breeze has sprung up to dissipate the heat, and when one hot day or week has ended in a cool wave, apparently no one ever expects to experience another. So sensitive are fan sales to weather conditions, in fact, that, other things being equal, the sales of fans from day to day will fluctuate in exact ratio to the fluctuations of temperature. For this reason, it is obvious that the salesman who works while the sun shines is the one who will put his fan business over big.

Advertising the Fan —

When the warm weather is present, every possible means of placing the message of fan comfort before the public should be utilized to the limit. The sales helps furnished by the fan manufacturer should be employed so that every possible user of a fan will get the message in some form. Newspaper advertisements, movie slides, window displays, mailing folders, all available advertising helps should be put to work on the first real hot day.

These advertising helps should, of course, be supplemented by personal and telephone calls, where the prospects are best for sales. Lists of such prospects should be made up in advance of the fan weather, so they will be ready for use when the hot weather breaks.

In Homes —

Lists should be made up of homes where there are small babies and invalids. These can be compiled from news items in the press and from birth

records. Such prospects could be covered by telephone calls. A tactful reference to the value of a fan as an aid to convalescence or as a comfort to the little one, with an inquiry as to whether the prospect would like to have one sent for trial, will bring many trial requests at small expense, and once the fan gets into such homes on trial, the results it shows will usually make the sale.

In the Office —

Small offices, such as the doctor's, dentist's, lawyer's, architect's and others, can also be solicited by telephone. A cheery reference to the heat and a request to permit a fan to be sent over to demonstrate how much better the work will go with its help, will usually prove productive of many orders.

Large offices where many people are employed should be given attention by personal calls. Here the advantages of fan comfort can be sold on a straight business basis. The manager or owner should be told how fans will pay their cost and over again every season in more and better work and better satisfied employees.

Stores, motion picture theatres, restaurants, soda fountains, hotels, etc., are all good prospects for quantity sales. Here, of course, the salesman should show the proprietors how fan comfort will attract people to their places of business during the hot weather. He should also show how it will make their clerks, waiters and other employees more alert and cheerful, with a result which will react upon the patrons they serve and result in more liberal patronage.

In Factories —

Factories, particularly those where girls are employed, are excellent prospects. During the hot weather, heat prostrations are common among girl factory workers, resulting in reduced production, expensive medical attention and dissatisfaction among the employes. When the employer realizes that the installation of electric fans will eliminate these difficulties, he will recognize the purchase of a fan equipment as a profitable investment.

Hospitals are excellent prospects, as the fan is a real aid to quick convalescence during hot weather. When the hospital board cannot be influenced by direct salesmanship, often they be sold through indirect methods. For example, a fan sold or loaned to one private patient in the hospital will make such a strong contrast between the room where the fan is used and others not so equipped, that doctors and nurses will be strongly impressed with the value of fans, and their remarks will help put the message across with the management and directors.

The Value of Demonstration —

Wherever the fan can be shown in operation, it is always in itself the best possible fan salesman.

A demonstration is better than the best verbal arguments of the best salesman. During hot weather the store should be equipped with fans in operation, so that no person can come into the store for any purpose without getting a demonstration of fan comfort. Price tags, counter signs and folders should be arranged about, so as to invite a direct inquiry from the caller before he leaves the store.

The passers-by on the street can be reached in a similar way by having a fan in operation just outside the window or door, so that it directs a breeze toward the sidewalk. A sign near the fan, such as, "If you enjoy this breeze, take it with you. Come inside for particulars," or something of this nature, should be used to clinch the sales message of the fan.

If sales policies will permit it, fans should be sent out on trial at every opportunity. However, in doing this it is very important that they be sent at the right time. On a cool day a fan sent out on trial is effort wasted. On a severely hot day, it nearly always means a sale, as mighty few people are willing to give the fan up when they are enjoying its use.

A Fan as an Investment —

The instalment plan of payment is a big help where it can be used, particularly when the power company is selling the fan and charges for it simply by adding a small amount to the bill for current each month. Paid for by this method, the purchase of a fan seems like a very small item to the average customer.

It is also well to emphasize the low current consumption of the fan by pointing out that it uses no more current than an ordinary Hydro lamp, and that it will not add a noticeable amount to the monthly current bill. Many people imagine, because a fan makes a great stir and commotion in the air, that it must use a lot of current. This impression should, of course, be corrected.

In every case, whoever the customer may be or whatever the sales plan may be, emphasis should be laid upon the fact that a good fan is not a purchase for one season only, but that the fan will last many years—often a lifetime, and figuring the cost of such a fan in terms of cost per year, it represents an investment of but two or three dollars per year, in return for which the owner receives many dollars value per year in comfort, better health, and better work.

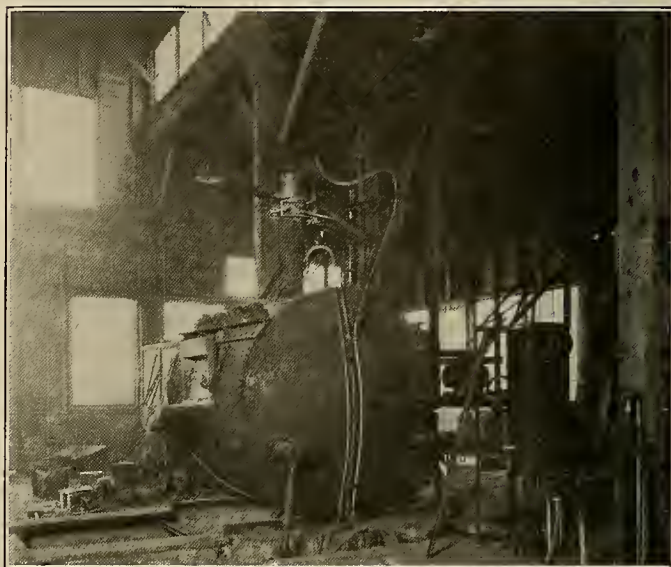
ELECTRIC ARC FURNACE IN USE

(The possibilities of electric smelting in the West have been the subject of much recent discussion. Whether sufficient cheap power is available for ore reduction is still a matter of question, but the use of electricity in steel making seems to be firmly established, as indicated by installations similar to the one here described.—The Editor.)

The Aurora Foundry Company of Seattle, Washington, installed a 1½ ton single phase, Greene Arc Furnace for melting steel for castings, and this furnace is now in regular operation since early in December, 1918. It is capable of melting 1½ tons

of steel scrap and finishing this metal ready to pour into castings in about two hours' time.

The electrical equipment consists of two 400 kva. single phase transformers, taking current at 15,000 volts and transforming to about 100 volts on the furnace. These transformers operate in parallel. The electrode is operated by hand, and the contacts in the electrode holder are water cooled.



A 1½ ton Greene Arc Furnace as installed at the Aurora Foundry, Seattle

This furnace is built of the standard Greene Rolling Cylinder type of construction. The shell is of heavy plate riveted to dished boiler heads, and a track is attached to the bottom of the shell providing for the rolling of the cylinder on the heavy rails of the foundation. Hydraulic cylinders attached at the end of the shell where they are out of danger from any molten metal serve to tilt the furnace. It may be tilted forward for pouring the metal or backward for the removal of slag.

The door is of special construction and may be very easily sealed to prevent air getting into the furnace. The lining is specially designed and is adapted to long life under the heat of the electric arc.

The Greene Slag Process is used for melting and finishing the steel. When steel scrap is melted in an electric furnace, the rust or iron oxide covering its surface is melted and absorbed in the molten mass. In addition, if the molten metal is exposed to the air a certain amount of oxygen is absorbed from the air. These absorbed oxides are the chief cause of "wildness."

The Greene Slag Process is a method of producing a fluid slag from very cheap and common material which floats over the molten steel in the furnace, preventing the air from coming in contact with the molten metal and being absorbed. At the same time the floating slag absorbs the oxides from the molten metal so that at the proper time these oxides are reduced in the slag by the addition of inexpensive reducing agents, returning the formerly oxidized steel to the molten metal below, as pure steel. The result is that the steel is "killed" perfectly within the furnace and at a material saving over other and more uncertain methods.

Safety First Instruction Through Moving Pictures

BY ERNEST A. DENCH

(The movie has now attained to a secure position as a medium of education; and as an aid to the safety-first campaign especially it has obvious advantages over other methods by virtue of its concrete dramatic possibilities. The fact that suitable films are available, at very slight expense, to any company desiring to use them, will doubtless lead to a more general adoption of this method of educating employees.—The Editor.)

Are your drivers careful? They may have the best intentions in the world, but unless they are taught to respect safety-first measures, their good intentions will amount to nothing. The writer lives in an outlying section of a large city, and during the present summer when the children have been playing in the streets, he has not failed to note the careless driving indulged in by the boyish chauffeurs entrusted with the delivery wagons. It has been little short of a miracle that no children have been killed, considering the amount of speeding and the swift turning of corners indulged in. This is the sort of thing which is going on all over the country to a greater or less degree, together with other violations of safety-first measures. And the company's first knowledge of a driver's carelessness will be when some one files a suit for injuries received. The loss of several thousand dollars is not all; the company must consider the amount of bad feeling which such a case causes among its customers.

Illustrating Your Safety-First Talks —

Even though you may be in the habit of giving your drivers a safety-first talk every week, you can make your talks much more effective if you illustrate by motion pictures the examples given. It has been stated that "eighty-seven per cent of human knowledge comes through the eye-gate," and where can you find another medium which visualizes facts, drives home concrete examples, and stimulates the imagination as the moving picture does? It is by appealing to the imagination that we are able to use the necessary foresight in guarding against accidents.

Films Available for the Purpose —

It is no longer necessary for a company to go to the great trouble and expense of having a suitable safety-first film made, for there are already several excellent reels available from sources that employ motion pictures exclusively for educational purposes. This means that the company can secure the loan of suitable safety-first films at less than what they cost to produce and distribute.

First, there is the reel entitled "The Making of a Convert," to be obtained from the National Safety Council, Continental and Commercial Bank Building, Chicago, Illinois, through members of the council. The rental charge is \$1.25 per day. The story this picture tells is of a motorman who does not believe in the principles of safety-first. He refuses to obey any of the company's precautions, but in the end he is persuaded to attend several safety-first meetings and becomes an enthusiastic convert to the cause.

Another picture to be obtained from the National Safety Council is "The Rule of Reason." The story deals with the influence of drink and

its effect on railroad work; but as the drink appeal is universal, the picture is quite suitable for any company's purpose. The writer has not been able to see the picture, but, according to the synopsis supplied, it deals with Bob Tracy, a young man employed as a yard brakeman, who, because of unsafe habits, is a thorn in the side of his brother-in-law, the superintendent. Hoping to inculcate safety ideas in the young brakeman's mind, Foster puts him on the safety committee. Bob is in the habit of drinking on the sly. He does not get drunk and his fellow employes are not aware of the habit. In a dramatic scene, Bob's sister endeavors to make him see that men engaged in hazardous employment should maintain habits that will ensure a perfectly normal physical and mental condition at all times, which to her mind is a "rule of reason." Neglecting to close a switch one day, after he has let a train in on a yard track, and falling asleep because of his improper indulgence, Bob dreams that a frightful yard collision occurs through his neglect. Awakening from his dream with a start and stricken with fear and horror, he stumbles forward and throws the switch to proper position, and then to his great relief finds the train still safe. But he has had his lesson, and thereafter mends his ways.

Two excellent safety-first reels which have been produced under the auspices of the Secretaries of States and the Police Departments are "Careless America" and "Safety-First." "Careless America" deals with automobile accidents from the public's viewpoint. In a spectacular manner it shows what is likely to result from crossing the streets without taking the necessary precautions to ensure protection from passing motor vehicles. This life conservation film is also of educational value to chauffeurs.

"Safety-First" introduces the Secretary of State for New York, Francis Hugo, head of the world's largest vehicle bureau, and views of the continuous stream of cars on New York's Fifth Avenue. We are now informed that of the 75,000 chauffeurs in New York, sixty per cent are foreigners. We are shown the road test and the written examination which the driver in New York state must pass in order to obtain a license. Next follows a safety-first talk which is given every week to the drivers of a New York department store. The road test given to every woman enrolling as an ambulance driver is convincingly presented.

"Careless America" and "Safety-First" are distributed by the Universal Film Company through their local branches. The former reel is obtainable at the cost of transportation only, while for the latter \$2.00 per day is charged.

There are also other safety-first subjects in movie form, with rentals as high as \$10.00 per per-

formance. But there is no object in the company incurring such an expense when there are excellent safety-first reels available at the cost of distribution, produced by educational institutions with the sole object of reaching as large a number of drivers as possible.

Unless the company has a portable projector and can therefore screen the pictures in a room in

their own building, the best way to save the expense of obtaining the necessary equipment is to rent the local photoplay theater for an hour in the morning.

To cut the operating expenses the company should get other local concerns interested in the scheme, for it involves no more trouble or expense to show motion pictures before a large audience than before a small audience.

A Summer Use for Your Roof

BY R. B. MATEER

(The combination of fresh air and exercise with the business of the day is no longer to be a monopoly of the postman. A public utility company, recognizing the fact that the health and poise of its employes is a double blessing, has turned its roof into a drill ground and added a hiking club to its list of employes' activities. The plan and its success are described below. The author is connected with the commercial department of the Philadelphia Electric Company. —The Editor.)

The increasing realization of the importance of physical health in all branches of human activity has resulted in varied and continued efforts to improve the physical standard of the world's workers. At first these plans emanated chiefly from governments in the form of laws limiting the hours of labor, providing for ventilation and proper equipment, and so forth. More recently, however, there has been a growing tendency among large concerns to take this matter into their own hands and inaugurate various schemes for the better health of their employes.



Daily setting-up exercises on the roof are led by Captain Mateer. Good-fellowship and good health are the aim.

On the Roof —

Among recent undertakings of this kind is that of an enterprising public utility which has initiated at its general offices, under the auspices of its Athletic Association, a daily class in "setting up" exercises. The time is from 12.05 to 12.20 p.m.; the place is the tile roof of its nine-story office building.

As the place is not suitable for close order drill, or marching at quick or double time, "setting up" exercises tending to all-round development are employed. Those generally used are such as affect the extensor and flexor muscles. No portion of the body is exercised continuously—an arm or shoulder exercise being followed by a trunk exercise and it in turn by a leg or neck movement. The classes have been well attended and the members have shown noticeable improvement in carriage and alertness.

In the Field —

As a further experiment in this direction the

members of the class were invited to a "hike," and turned out in full force. After an hour or more of rambling through the country, they spent the remainder of the afternoon on the grounds of the Athletic Association, some playing golf. The success which attended this venture resulted in "hikes" being planned for the entire summer.

In addition to the beneficial physical effects achieved by these out-of-door schemes, a marked gain in corporate feeling and interest has been noted. Both individual and corporation profit from anything tending to cultivate that self-reliance and enthusiasm which are essential to effective service.



A blue print poster touched up with colored crayons calls the employes of the Philadelphia Electric Company to a Get-Acquainted Hike.

High Power Factor Induction Heaters

BY C. EDWARD MAGNUSSON

(The use of induction heaters has hitherto been greatly limited by the fact that they displayed a poor power factor and emitted an annoying humming noise which it seemed impossible to remove. Both of these defects have been practically eliminated by a new design recently perfected, as indicated in the test data presented below. Some of these heaters have been in satisfactory use for over eighteen months. The author is professor of electrical engineering at the University of Washington.—The Editor.)

Induction heaters have been on the market for a number of years, but their use has been limited, mainly on account of two undesirable features—low

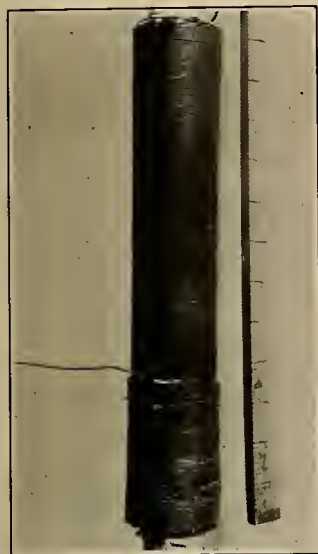
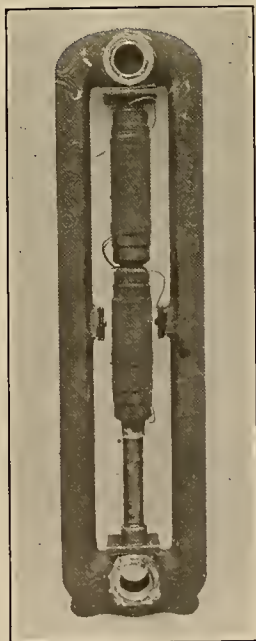


Figure I.—A 1200 watt, 225 volt, 60 cycle induction heater. The scale shown at the right is in inches.

No. 1. A 500 watt, 240 volt, 60 cycle heater, similar in design to Fig. 1.
Core: 1 inch (25mm.) standard iron pipe.
Secondary: No. 22 bare copper sweated with solder.
Primary: 3300 turns of No. 20 copper wire.

Volts	Amperes	Watts	Power factor in %	Temp.
240	2.19	508	96.6	50°C.

Figure II.—A 2000 watt, 240 volt, 60 cycle induction heater. The simplicity of the design is to be seen in this radiator. As the water gets warmer less current flows for a given voltage, but the power factor remains practically constant. The temperature of the water in the pipe affects the resistance of the secondary winding. The warmer the water, the higher the resistance and hence, the less current will flow for a given impressed voltage; but the power factor stays practically constant.



No. 2. A 1200 watt, 225 volt, 60 cycle heater, Fig. I.
Core: 1 inch (25 mm.) standard wrought iron pipe.
Secondary: No. 22 bare copper sweated with solder.
Primary: 1704 turns of No. 18 "deltabeston" insulated copper wire.

Volts	Amperes	Watts	Power in %
219.0	5.44	1135	95.3
225.0	5.66	1210	95.2
226.0	5.56	1200	95.6

power factor and the humming sound produced. The handicap of an 80 per cent or even lower power factor, as is the case in most induction heaters, has proved too great for successful competition with the resistor type having unity power factor at all loads. Moreover, the alternating flux produced vibrations giving a disagreeable humming sound, which practically excluded heaters of the induction type from residences and other places where noises would be objectionable.

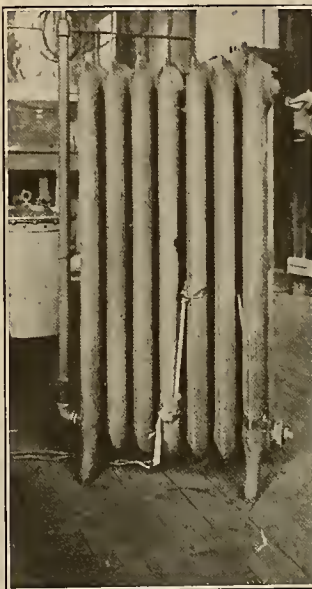


Figure III.—A 2000 watt, 240 volt, 60 cycle induction heater in a water radiator. The result of the test is given in the accompanying table. Note the thermometers attached.

No. 3. A 2000 watt, 240 volt, 60 cycle heater. Fig. III.
Core: 1 inch (25mm.) standard wrought iron pipe.
Secondary: No. 24 bare copper sweated with solder.
Primary: No. 18 copper wire wound in two coils of 1480 turns each.

This heater was inserted in a three-column Rococo water radiator, Fig. III, and tested, with results as given in the following table.

Time	Volts	Amp.	Watts	Per cent	Room	Temp., Deg. C. Radiator	
						Bottom	Top
10:30	240	9.9	2315	97.5	21.5	22.5	24.0
10:30	240	9.5	2190	96.1	21.5	23.0	34.2
10:40	240	9.25	2140	96.4	21.6	30.0	43.5
11:00	240	9.1	2100	96.3	21.5	40.0	54.5
12:00	240	8.8	2030	96.2	21.8	58.0	72.0
1:00	240	8.7	2010	96.2	22.2	68.0	82.0
2:00	240	8.65	2000	96.4	23.4	70.0	82.8

By means of a new design (U. S. patent 1,260,564) the undesirable features have been eliminated and, moreover, the life of the heater has been increased and the cost of manufacture reduced. Induction heaters of an extremely simple design may now be constructed at low cost, which are practically noiseless and which operate at 95% or even higher power factors.

Design and test data are given for five heaters adapted to household service. In each the iron pipe through which the heated water flows forms the transformer core. The secondary of the transformer

consists of a single layer of copper wire wound in a tight helix around the iron pipe and sweated with solder into a continuous sheath. Thus the secondary winding consists of one turn of low resistance in contact with the iron core. The primary is made of asbestos insulated copper wire wound tightly around the secondary.

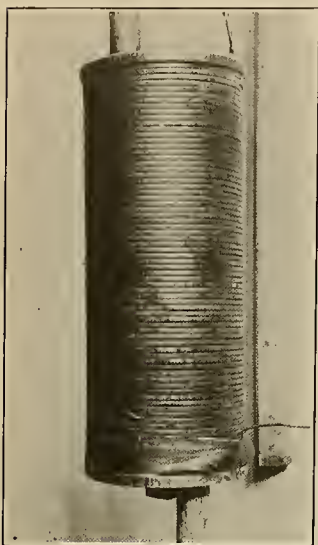


Figure IV.—An "instantaneous" type induction heater—2300 watts, 110 volts, 60 cycles. The scale is in inches. This heater is for intermittent service, heating the water as it is drawn from the faucet.

No. 4. An "Instantaneous" type. 2300 watts, 110 volts, 60 cycle. Fig. IV.
Core: 3 inch (76 mm.) standard wrought iron pipe.
Secondary: No. 22 bare copper sweated with solder.
Primary: 440 turns of 45 x 125 mil. "Salamander" insulated wire.

Volts	Amperes	Watts	Power in %
110.0	21.97	2290	94.9
110.0	21.62	2290	96.2
113.2	22.62	2420	94.5
112.0	22.52	2410	95.5
111.8	22.42	2370	94.6

This heater is for intermittent service, heating the water as it is drawn from the faucet.

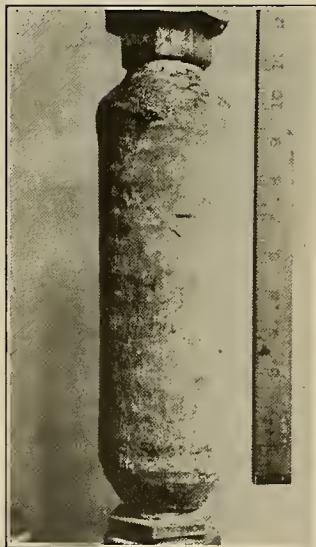


Figure V.—An induction heater of 2800 watts, 225 volts, 60 cycles. The accompanying scale is in inches. Heaters of this type were used at the Puget Sound Navy Yard for heating drafting rooms. The sound given out by these heaters was barely audible and in no way annoying.

No. 5. A 2800 watt. 225 volt, 60 cycle heater. Fig. V.
Core: 1½ inch (38mm.) standard wrought iron pipe.
Secondary: No. 21 bare copper sweated with solder.
Primary: 800 turns of No. 14 (asbestos insulated) copper wire.

Volts	Amperes	Watts	Power in %
220.0	12.91	2700	95.0
225.0	13.20	2830	95.5
227.0	13.36	2880	95.1

The primary winding was impregnated and coated with sodium silicate.

Heaters of this design have been used in the Puget Sound Navy Yard at Bremerton, Wash., during the past eighteen months for heating drafting rooms. Each heater will keep a 60 sq. ft. hot water radiator between 190° and 200° F. The sound emitted by these heaters was barely audible and caused no inconvenience to the draftsmen.

A BOILER TEST WITH POWDERED FUEL

(The question of fuel for use in industrial plants has always been a much-debated one in regions where coal is scarce or of poor grade. Interesting results have recently been obtained in Vancouver, B. C., from tests made with powdered coal, and are printed below. The material used in these tests was of a grade very much inferior to the California coals.—The Editor.)

Date.....April 7, 1919
Location.....B. C. Sugar Refining Co., Ltd., Vancouver, B. C.
Make and Type of Boiler.....Badenhausen Vertical Water Tube
Object of Test.....Efficiency, Rate of Evaporation, and General Results.

Duration of Test.....6 hours

Fuel:
Kind.....Vancouver Island, Nanaimo, Bituminous, Slack.
Analysis.....Moisture 1.1%, V.C.M 32.8%
F.C. 37.7%
Ash 28.4%, B.t.u. 9364
Pulverized.....81.1% through 200 Mesh
95.25% through 100 Mesh
Wt. of Coal as Fired.....16,824 lbs.

Water:
Wt. of Water Fed to Boiler.....122,345 "
Temperature Feed Water Entering Boiler.....177 degrees
Temperature Feed Water Entering Economizer.....85 "

Steam:
Pressure by Gauge.....71 lbs.
Superheat.....Boilers designed for 10° or 12° superheat, but not considered in this test.

Factor of Evaporation.....1,068

Hourly Rates:
Dry Coal per Hour.....2,707 lbs.
Water " " Actual.....20,390 "
Water " " F. & A. 212°.....21,776 "

Capacity:
Boiler h.p. Developed.....631 h.p.
Rated Boiler h.p.....504 "
Percentage of Rated Capacity Developed.....125%

Economy Results:
Actual Evaporation per lb. of Coal as Fired....7.5 lbs.
Equivalent Evaporation per lb. of Coal as F. & A. 212°.....8.04 "

Efficiency:
Combined Boiler and Furnace Efficiency Based on Coal as Fired.....83.3%

Flue Cases:
Temperature of Escaping Gases from Boiler Average.....500 degrees
Temp. of Escaping Gases from Economizer.....285 "
Analysis of Gases CO₂ by recording apparatus Average.....13%
O, by Orsat apparatus.....6 to 8%
CO, " " ".....None

Smoke—Very light white haze.

Draft—Over fire ¼ in.; at stack ⅝ in. to ¾ in.

Furnace Temperature—2200° to 2540°. Average 2425 degrees

Notes

The boiler after being in operation 3 weeks showed no accumulation of slag, or ash in tubes or furnace. The ash deposited in the bottom of the furnace was easily removed. The fine ash in the dust chambers was removed weekly. Small turbine driven fans provided sufficient air to carry the fuel into the furnace. Part of the air for combustion was admitted through the damper doors in the furnace front.

"CO₂" readings were taken continuously by Simmance-Abady recorder. Oxygen readings were taken on Orsat apparatus. The feed water was weighed in the tank and supplied to the boiler through a separate pump with all connecting lines blanked off.

Furnace temperatures were taken with "Tycos," Fery radiation pyrometer (Taylor Instrument Co.). The calorific value of the coal was determined by the calorimeter test—G. S. Eldridge & Company, Vancouver, B. C.

The complete equipment was designed and installed by the Fuller Engineering Company, Allentown, Pa., U. S. A.

Notes on Suspension Insulator Design

BY H. L. GARBUTT

(The necessity of adapting insulators produced under factory conditions to conditions as they actually exist in practice on the Pacific Coast has led to a careful analysis of deterioration causes and to a suggested modification of insulator design. The results of tests upon these modified forms are here presented with the encouraging outlook of improved service as a possibility. The author is the recently appointed San Francisco supply manager of the Westinghouse Electric & Manufacturing Company and was formerly associated with insulation research work with that company.—The Editor.)

The very rapid development of transmission engineering has often forced the engineer to design insulators for installation on high voltage lines with little previous operating experience of any kind as

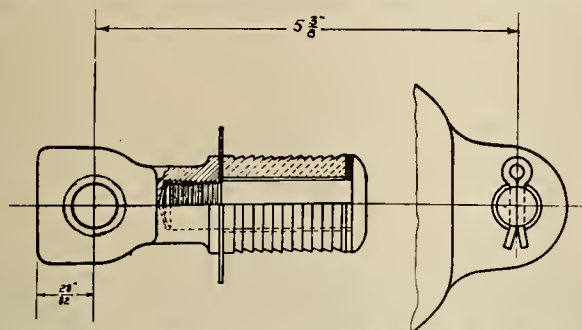


Fig. 1.—Solid type eyebolt with a porcelain sleeve. Expansion of the eyebolt will not apply mechanical stress to the porcelain.

a basis, and with no service data of the operation of insulators at the voltage for which the insulator was being designed. As the amount of power transmitted and the distances of transmission increased, it was necessary from an economical standpoint to raise the voltage of the line accordingly. Above 66,000 volts the older designs of the pin type insulators were unsatisfactory because of mechanical and electrical characteristics and the cost. Also, the quality of the porcelain body of the pin type insulators installed on the early high voltage lines was much inferior to the quality of the present insulator body.

Moreover, the factory tests made on the individual shells and on the assembled insulators were based on a percentage of line voltage instead of on flashover voltage. In fact, in many cases the test voltage on an assembled unit consisting of three pieces of porcelain was less than the test now applied to individual shells of such a unit. The large number of failures that occurred on the lines insulated with the early designs is now a matter of well known history.

The suspension insulator string, consisting of a number of units of low cost joined in series, apparently offered the best possibilities as regards cost of the insulator, ease and cost of installation, etc. The link type of suspension unit and the cap and pin type were advocated by different engineers, some favoring one type and some the other. From considerations of factory production, ease of installation on the line and replacement on the line, and other factors well known to the transmission engineers, the cap and pin type suspension insulator was rather generally adopted.

Theories of Suspension Insulator Deterioration —

The deterioration of cap and pin type suspension insulators is well known to the operating engineers

and the manufacturers of electrical porcelain. Numerous technical papers have been published in the engineering periodicals expressing the opinions of operating engineers, the opinions of research engineers of manufacturing companies and the opinions of professors of the technical universities. These opinions are fully discussed in the Transactions of the A. I. E. E., 1910 to 1918, inclusive, and will not be mentioned here except in a rather general summary.

An analysis of these technical papers gives four main theories to express the deterioration of the cap and pin type suspension insulator.

1st. The porcelain body between the cap and pin absorbs moisture until the resistance of the unit is so low that the voltage across it is extremely small or the porcelain punctures under normal operating voltage. In either case practically the entire electrical stress is impressed on the remaining units in the string.

2nd. The insulator unit consists of a metal cap and metal pin assembled to a porcelain by means of neat Portland

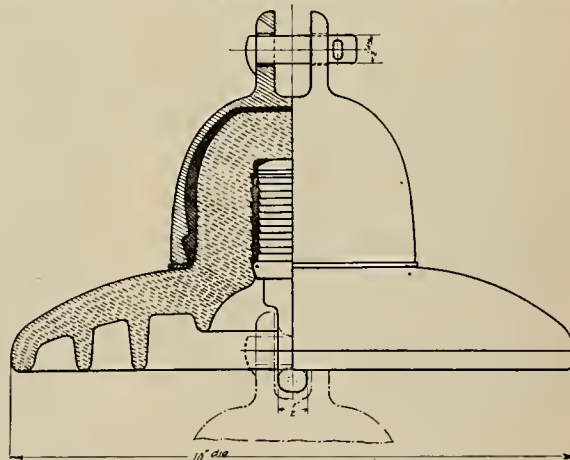


Fig. 2.—The porcelain sleeve eyebolt of Fig. 1, assembled. The temperature coefficient of the sleeve and insulator will be the same.

cement. These three materials have different temperature coefficients of expansion, the metal parts having the highest coefficient and the porcelains the lowest. The ratio of coefficients is approximately 4 to 1. The changes of temperature, both gradual and sudden, tend to apply stresses to the porcelain and cause cracking. It is generally considered that the cap causes the least trouble as regards cracking of the porcelain between cap and pin. However, in the early designs the cap was allowed to rest on the porcelain rain shed with the result that the sheds were often pushed off.

3rd. The insulators may stand temperature changes satisfactorily when first placed in service. However, the cement may continue to set after installation of the unit in line service and crystallization may take place with a slight enlargement of the cement section. The expansion of the metal pin would then apply a stress to the porcelain during temperature changes sufficient to cause cracking.

4th. The insulator unit passes through daily and seasonal changes of temperature. During these changes the cement must at times pull away from the surface of contact with the metal. Films of salt formation are formed in the air space left between metal and cement. When the temperature cycle has returned to the condition where cement and

metal were previously in contact there will be additional stress applied to the porcelain, due to this film of salt formation. The thickness of the film would increase with the number of cycles and ultimately cause failure of the unit by cracking the porcelain.

Suggested Modifications of Design —

With these theories in mind, two modifications of the customary solid type of eyebolt were proposed:

- 1st. Eyebolt having a porcelain sleeve shown in detail in Fig. 1, and assembled with porcelain in Fig. 2. As evident from the detail drawing, transverse and longitudinal expansion of the metal parts of the eyebolt will not apply mechanical stress to the porcelain. The temperature coefficient of expansion of the sleeve and insulator will be the same.
- 2nd. Eyebolt having pressed metal sleeve shown assembled with porcelain in Fig. 3. Here the expansion of the metal pin is taken care of by the slight air space between

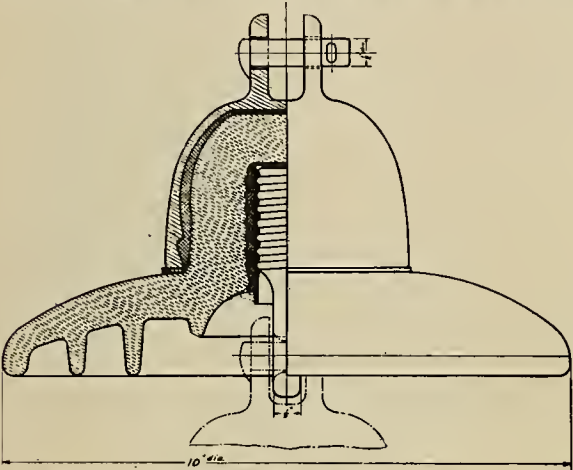


Fig. 3.—Eyebolt with pressed metal sleeve, assembled with porcelain. The expansion is taken care of by the slight air space.

eyebolt threads and the thimble, the resilient washer at top of eyebolt being of assistance in minimizing stress from longitudinal expansion of the pin.

Tests to Determine Comparative Resistance to Temperature Changes —

The effect of stresses as outlined under Theory 2 was determined as follows:

Two water baths were maintained at 98° C. and 4° C. and the insulators plunged from one to the other. Insulators having the customary type of eyebolt shown in Fig. 4 and insulators having the suggested modifications of eyebolt design were put through the same cycles of test. The units were plunged into the water, cap first, transfer between baths being made as quickly as possible. The first ten cycles were according to design test specifications of one of the large purchasers of suspension insulators. Each cycle consisted of four changes, the insulators being first plunged into the hot bath and allowed to remain one minute. They were then plunged into the cold bath for a period of three minutes, back to the hot water for one minute and again to the cold for one minute. After each cycle of four plunges the units were tested to flashover voltage. The severity of the cycles was gradually increased. The number of cycles and the severity of the cycles to which the insulators were subjected, and the order in which the cycles were given, are tabulated below.

TABLE 1 — TIME IN MINUTES					
Test No.	No. of Cycles	Hot Water	Cold Water	Hot Water	Cold Water
1	10	1	3	1	1
2	5	1½	3	1½	1½
3	5	2	3	2	2½
4	6	3	3	3	3
5	3	4	4	4	4
6	2	5	5	5	5
7	2	7	7	7	7
8	4	10	10	10	10

Failures According to Cycles —

The comparative ability of the various designs in resisting this test of increasing severity is shown in Table 2. The insulators in Batch A (Fig. 4) have

a solid metal eyebolt cemented directly into the porcelain. The insulators of Batch B (Fig. 2) have an eyebolt of porcelain sleeve type (Fig. 1) cemented into the porcelain. The insulators of Batch C (Fig. 3) have an eyebolt of pressed metal sleeve type cemented into the porcelain.

TABLE 2											
	Batch	No. of units tested	1	2	3	4	5	6	7	8	No. still intact
Solid	A	16		1		4	5		2	2	2
Porcelain Sl.	B	14						1	2	6	5
Metal Sleeve	C	14									14

In Table 2 the failures due to temperature changes are roughly grouped under the various tests, that is, no account is taken as to which particular cycle of a certain severity the unit failed under. Batch A, having the solid eyebolt cemented directly into the porcelain, started to fail much earlier than either of the other types. Batch B (porcelain sleeve type) showed a very decided advantage over the type having the solid eyebolt. In fact, no failure

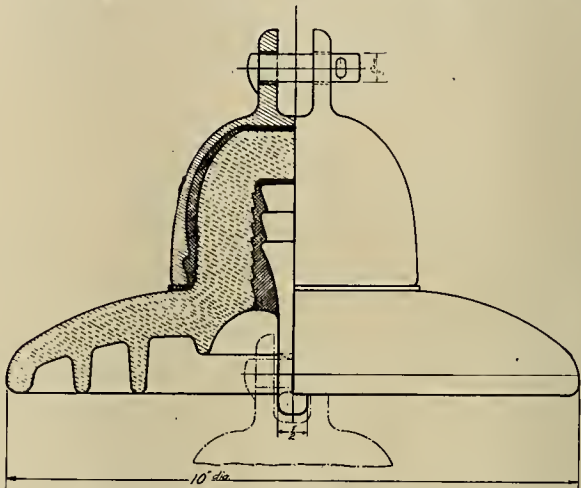


Fig. 4.—Solid metal eyebolt cemented directly into the porcelain

occurred until the cycle of temperature changes was made very severe (5 minute periods). Only three failures occurred until 10 minute periods were reached. It is believed that the cycle of even 5 minute periods is so much more severe than any of the daily or seasonal changes that will be experienced in line service that little emphasis should be placed on failures occurring in cycles of longer than 5 minute periods.

The insulators in Batch C (metal sleeve type) showed a very decided advantage over the units having a porcelain sleeve type of eyebolt as well as over units of the solid eyebolt type. In fact, no failures occurred up to and including 4 cycles of 10 minute periods. It was considered impractical to continue the tests to a cycle of longer periods.

Electrical and Mechanical Characteristics —

The dry and wet flashover voltages of the three designs are practically identical. The ultimate mechanical strength in tension of the three types ranged from 9000 lbs. to slightly over 10,000 lbs., the solid eyebolt type having a slightly higher value. However, it is believed that slight changes in the designs of the eyebolts having porcelain sleeves or metal sleeves will bring the mechanical strength of the three types to practically the same value.

Conclusions —

Probably the porosity of the porcelain body of suspension insulators outlined under theory 1 has been the cause of failure of a large number of insulators in the past. During the early days of transmission engineering, the majority of engineers preferred an insulator having a porcelain body which offered a high resistance to mechanical breakage. As a consequence, the porosity of the material, which varies inversely to the mechanical strength as regards resistance to mechanical impact, was considered of secondary importance.* The more thorough knowledge which the ceramic engineer now has of the characteristics of body ingredients and more painstaking factory control should practically eliminate porous ware in the future.

The advantages of the modifications of eyebolt design either of the porcelain sleeve or metal sleeve types are very apparent as regards laboratory tests

of temperature changes. The metal sleeve design apparently resists the changes better than the porcelain sleeve design, but the cycle of test under which the insulators having eyebolts with porcelain sleeves started to fail was probably much more severe than the conditions met with in line service.

It is rather apparent that the laboratory tests made on these insulators should give comparative data as regards the ability of the various designs in resisting sudden temperature strains. Obviously, the stresses that would be placed in the porcelain by changes according to Theories 3 and 4, cannot be satisfactorily duplicated in the laboratory. However, it is believed that either of the suggested modifications will materially lessen the probability of failures that may be caused according to these theories. This should be especially true of the metal sleeve design, since any very appreciable stress will distort the metal thimble and thus equalize the stress on the inside of the porcelain cap.

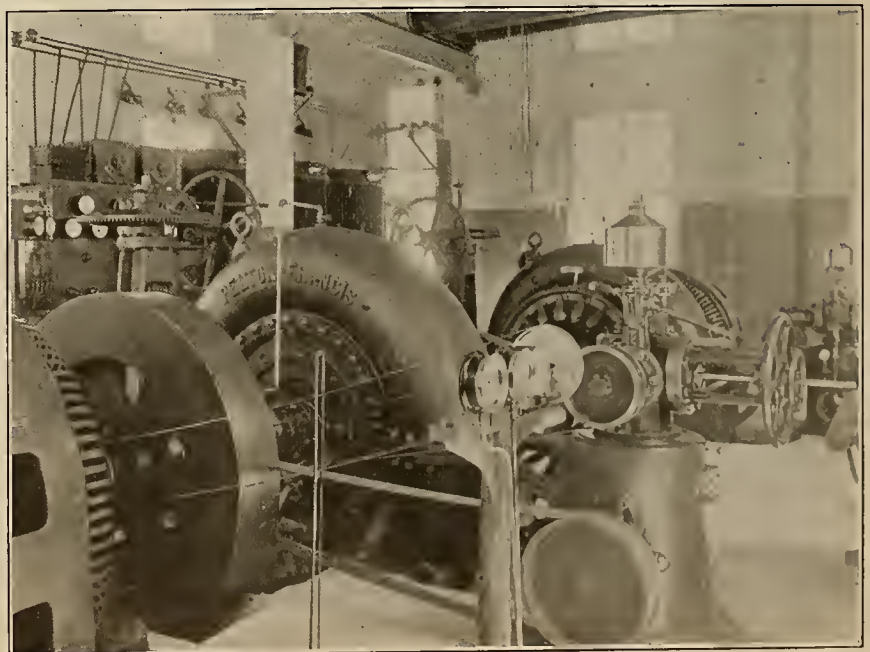
*See Electric Journal, March, 1918.



YOSEMITE VALLEY POWER PLANT

The plant which supplies the Yosemite Valley with power is located at the Cascades, just below the valley proper. It has a capacity of 2000 kw. with a present output of 1000 kw. This supplies all valley lighting, as well as the extensive electrical cooking and power installation at Camp Curry. Two hotel type electric ranges, a 3 kw. toaster, an electric bake oven, three dishwashers, a griddle, a rotary saw, as well as other smaller appliances are among the electric equipment at this camp.

Two 1250 kva. G-E 2300 volt, 30 cycle, 3 phase a.c. generators direct connected to a 1500 h.p. Pelton Francis turbine furnish the power. The exciters are 10 kw., 1250 v. direct connected. Three transformers, oil cooled, of the outdoor type, 60 cycle, 400 kva., located at the plant step the current up to 11,000 voltage, at which it is transmitted to the valley. The ordinary voltage for valley use is 2300 v.

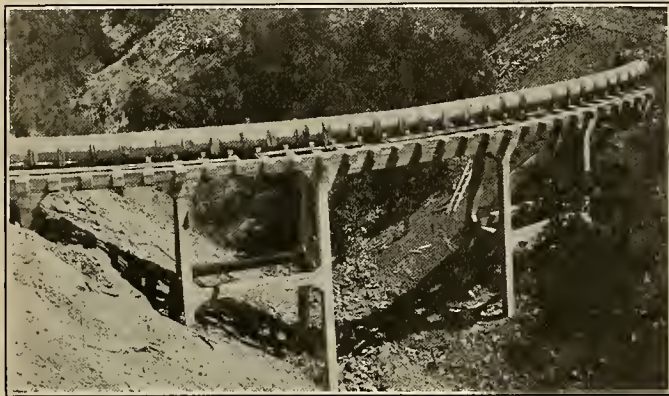


Construction Details on the Marin Water and Power Project

BY H. M. BOWERS

(Cost and reconstruction data on the recently completed Alpine dam in Marin county, California. An 8700 ft. tunnel and interesting problem in pipe line construction over hilly country form two of the special features here taken up. A general description of the dam itself appeared in the April 1st issue of the Journal of Electricity. The author was assistant engineer on the work, in charge of office detail, designing, detailing and estimating.—The Editor.)

Pine Mountain tunnel, which divides the pipe line into two divisions of about $3\frac{1}{2}$ miles each, is 8,700 feet long, has a cross section of horseshoe shape and of about 54 square feet, net area. It is concrete lined throughout its length, the lining being 6 inches thick theoretically, over most of the length, but increasing to 12 inches near the portals and where the surrounding material is soft. Concrete inlet and outlet structures are provided at the portals. The contract for the tunnel was let to McLeran & Peterson of San Francisco and work was begun in December, 1916. Excavation was carried on from



Curves on the concrete pipe line were made by the combination of straight and beveled sections, trestles being necessary for bends more acute than the limiting 75° .

both ends and at such a rate that the headings met at the end of February, 1918. Lining was done under a sub-contract, by Cahill-Vensano Company of San Francisco, the principal contractors furnishing all material.

Tunnel Costs

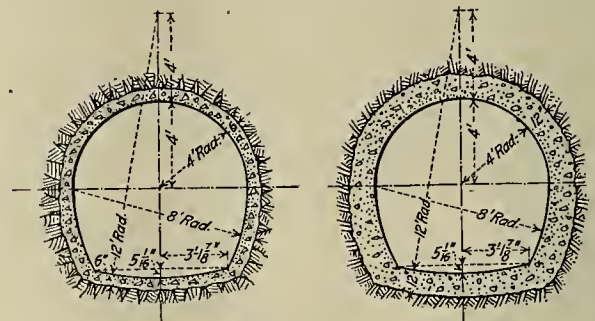
Complete data of the cost of the tunnel are not available, but from memoranda kept by the engineers in charge of the work the writer has deduced a few figures which may be of interest, though in each case they give the cost of labor only. From these memoranda it appears that the cost of labor alone for excavating and timbering (about 25% of the tunnel required some timbering) was \$14.18 per lineal foot, and that the cost of lining was \$5.07 per lineal foot, making the cost of labor for both excavation and lining \$19.25 per lineal foot. The average cost of labor for timbering was \$1.85 per lineal foot for the entire tunnel, but for the portion actually timbered the cost was \$7.55 per lineal foot. Rock for the concrete lining was quarried and crushed at the east portal at a cost for labor of \$0.73 per cubic yard of crushed rock. The cost of labor for lining the tunnel was \$5.25 per cubic yard, including quarrying and crushing of rock, or \$5.07 per lineal foot, as above. The volume of concrete placed in the

lining was 0.9640 cu. yd. per lin. ft. (0.8372 for top and sides and 0.1268 for the invert). As the volume required for a lining 6 inches thick would have been 0.5807 cu. yd. per lineal foot the overbreak was 0.3833 cu. yd. or 66%.

Compressor Plant Equipment

The tunnel was driven largely through black serpentine in which basalt boulders were frequently encountered. In places the formation was basalt and hard shale with seams of serpentine. Occasionally green serpentine was encountered. The tunnel may be considered a dry one, as water caused but little difficulty. A little trouble was caused by natural gas. Powder used for blasting was 40% nitroglycerine of which the quantity used was nearly 9 lb. per lineal foot, or 3 lb. per cubic yard.

Because of the inaccessibility of the west portal of the tunnel the compressor plant was placed on the county road at a point about 1000 feet from the east portal and about two miles from the west portal. Air was piped to the portals through $3\frac{1}{2}$ inch pipe lines. The plant consisted of three 25 h.p. Fairbanks-



Section of the tunnel. This was largely driven through black serpentine in which basalt boulders were frequently encountered.

Morse Y type semi-diesel engines and three 8 by 8 inch Sullivan compressors. A pressure of 100 lbs. per sq. in. at the plant was maintained and about 300 cu. ft. per minute of free air was compressed. Legner drills with sets of steel ranging to 8 feet in length were used for driving the tunnel. Jackhammers were used for trimming.

Concrete Pipe Line

To convey the water from the reservoir to the distributing system reinforced concrete pipe lines, 24 inches in diameter and with walls 3 inches thick, were used. The pipe was cast in sections in a pipe yard at Fairfax, in special steel forms made for the purpose. For reinforcement, collapsible spiral cages made by the American System of Reinforcing, Los Angeles, were used. The circumferential wire is $\frac{1}{4}$ inch in diameter, the pitch of the spirals is 3.3 inches in the second division where the static head is 40

feet, and 4.71 inches in the first division where the head is less than 30 feet. The pipe is laid in a trench 4 feet deep, excavated along a bench which was cut into the hillside for the main purpose of providing for the pipe line, but with the idea that a permanent roadway of considerable scenic merit may be maintained along the bench.

Handling Curves

The maximum curvature adopted for the pipe line was 75° on a basis of 50 ft. chords. The pipe is made in sections 3 feet long and to provide the curves, beveled sections, that is, sections shorter on one side than on the other, were used. To cast these a special top ring for the forms had to be made. To avoid the necessity of numerous beveled sections with different degrees of bevel only such degrees of curvature were used as could be made of combinations of straight line sections and beveled sections of the same amount of bevel. For instance, a 75° curve was made of beveled sections, a 50° curve was made by alternating two beveled sections with one straight line section and a 25° curve was made with two straight line sections and one beveled section.

As the country is hilly the limiting curve of 75° would not fit into all of the gulches along the line and the pipe had to be carried across these gulches on the trestles. These trestles were made of reinforced concrete and were of various spans according to the heights of bents required. The road runs around the trestles on such curvatures as were required to fit the gulches.

Personnel in Charge

All trenching and backfilling, building of trestles and gate houses and supply of valves were done by the District. The pipe was made and laid by Bent Bros. of Los Angeles, contractors, under the direction of their superintendent, J. G. Tripp.

Other features of the work which were done by contract were: clearing the reservoir site, changing about 4 miles of county road which passed through the reservoir site, excavation at the dam-site, excavation of a small tunnel on the pipe line, excavation of 7 miles of road along the pipe line grade.

During the entire progress of the work M. M. O'Shaughnessy was consulting engineer. At the time of its inception A. R. Baker became engineer of the District, as was stated above, and continued in that capacity until the work was completed. After the bonds were sold the writer became assistant engineer in charge of all office work—designing, detailing, estimating, etc. Division engineers on the work were C. T. Broughton in charge of the excavation of Pine Mountain tunnel and of trestle building and tunneling for the pipe line, Charles Brown in charge of the construction work at Alpine Dam, R. S. Hannis in charge of road work, lining of Pine Mountain tunnel and of trench excavation, and C. S. Robinson in charge of trenching and trestle building. The construction work had been completed and was turned over to the operating department on January 31, 1919. The District is operated by John Burt, general manager, San Rafael, California.

Western Ideas

THE NEWEST INDIRECT LIGHTING FIXTURE is the iron helmet. This is not a joke, but a practical idea; one moreover which has been successfully carried out. A helmet equipped with an X-ray reflector, suspended by chains, and wired up, proved to be a window display attracting wide and immediate attention. Moreover, it led to the prompt sale of chains and reflectors to the general public who also had returning soldiers, and consequently iron helmets, in the family.

With two million soldiers, accompanied by helmets, returning to the States, this ingenious idea is of no small value. Not one of them will want to part with this memento of his adventures, and the notion of utilizing it as an effective fixture, conspicuous but never in the way, is one which will inevitably appeal to his orderly and artistic women-folk.

For a window display a borrowed helmet may be used, and considerable interest added by a card describing some of its adventures. When the passers-by gather, most of them will decide that this is the true vocation of returned helmets and promptly provide themselves with the necessary apparatus for completing the fixture.

WHAT SALES MANAGERS SHOULD KNOW is the substance of the following tabulation by B. S. Cutler, Chief of Bureau of Foreign and Domestic Commerce, which appeared in a recent number of Advertising and Selling. Mr. Cutler believes that personality is not the only important factor in selling, but that a thorough acquaintance with the conditions of the market are essential. He says:

About an old or new market for an old or new commodity, I want to be continuously informed on the following points.

- a. Population figures.
 1. Racial predominance.
 2. Percentages of other racial stocks.
 3. General literacy or state of public education. (A very vital point in advertising, display methods, personal approach, etc.)
 4. Predominant employment, whether industrial, agricultural or mercantile.
 5. Percentages of other vocations and professions.
- b. Purchasing power per capita.
- c. Character of banks, whether liberal or conservative.
- d. Merchandising customs.
 1. Character of stores, whether department stores, or shops, or other sales methods.
 2. Payment habits, whether by cash or credit predominantly.
 3. Local delivery requirements.
 4. Use of sales floors or warehouses. (That is, do the merchants put the greater part of their stocks in one place or the other; some display only a few samples and deliver from warehouse.)
 5. The use of advertising mediums and outside solicitation.
- e. Banking facilities.
 1. Are the banks primarily absorbed in financing crops or factories?
 2. Are they generally conservative or liberal? (This has a bearing on the individual purchasing ability, if ready money awaits the marketing of crops or can be borrowed in anticipation of them.)
 3. The extent to which banks or other financial agencies accept mortgages on real estate. Liberality in this respect creates more fluid conditions of purchasing power amongst the public and stabilizes local conditions.
- f. Transportation facilities.
 1. What water, rail and trolley lines exist and carry package freight. (On this question hinges much of the marketing problem in the smaller commodities since they are readily distributed over a wide radius from warehouse centers.)

These questions might be elaborated or modified according to the commodity involved. They are suggestive mainly of an attitude of respect for the facts in the case. Certainly they can not be neglected by a manager who must reduce to a minimum the overhead costs of failure.

Water Supply and the Public Lands

BY W. B. HEROY

(The basis for the acquiring of water rights and power privileges in the great blocks of public lands soon to be thrown open to the public in California and Oregon is here explained in the first of a series of articles dealing with the classification of public lands and the acquiring of water power and right of way privileges. The author is connected with the Land Classification Board and the article is published with permission of the Director of the U. S. Geological Survey.—The Editor.)

The dominant factor in the development and use of the remaining public lands is water, not only surface water, but underground water and rainfall. The future extension of agriculture and grazing in the public-land states is directly dependent on the distribution of moisture, for, as a rule, the remaining public lands of the West are arid or nearly arid. The development of the mineral industries, of power, of transportation, and of manufacturing in this region are all intimately related to water supply.

From these premises it follows that an efficient organization for the disposal or administration of the public lands must have fundamentally an appreciation of the importance of this subject, and must include a technical force trained to obtain and make accessible to administrative officers and to the public the required data.

The Classification of Lands

The early Directors of the Geological Survey, Clarence King and John Wesley Powell, realized from its inception the importance of hydrologic investigations and for many years cherished the hope that means to do the work might be provided. The efforts of these men were rewarded in the creation by Congress in 1888 of an irrigation survey, and the systematic investigations of surface and underground water then begun are being continued at the present time.

Through these activities of the Survey and through the work of the Weather Bureau, which maintains a large number of stations for the collection of rainfall and other climatic data, the Government thoroughly covers the entire field of theoretical and applied hydrology. The usefulness of this work as an aid to public and private engineering enterprises requires no discussion, but the applicability of water-supply data to the solution of many of the problems of public-land administration is less generally understood.

The Basis for Classification

The classification of lands with regard to water supply requires as a basis not only knowledge of the water itself—of its quantity, quality, and distribution, but of the land—its topography, climatic and cultural conditions, and soil. These basic facts must then be studied in relation to the probable uses of the water, and distinction must be made between uses that leave the water essentially unimpaired in quality and undiminished in quantity, as water-power development; those that may impair its quality, as municipal or certain industrial uses, and those that may deplete its quantity, as irrigation. The forecasting of the probable future needs of a region and the consequent formulation of plans for the future use of the available water make a different

problem, into which many important factors now unknown or unappreciated may enter. The imperfection of any such plans must be at once conceded, but I think no one will seriously question the desirability of basing comprehensive schemes for future water utilization on the best obtainable information. It is only applying to problems of water supply the same type of engineering foresight that enters into city planning, railway extension, and many similar activities.

Future Development Considered

Plans for the highest future use of a water supply must involve as little sacrifice of present needs and growth as possible. The likelihood of conflict between present use and future development must be carefully considered, the rival claims must be harmonized if possible, and, when an impasse is reached, preference must be given to the higher use. Typical of such conflicts are those arising where effort is made to establish water-power plants in locations such that the subsequent use of the water for irrigation becomes impracticable or unduly costly, or to acquire mineral and agricultural title to lands that are most useful as sites for structures required for water-power or irrigation development.

State and Federal Control

The control of the water as a question of law and administration is an important element in the problem. Under our system of government this control is divided between the States and the Union. To this separation of functions must be attributed much uncertainty, confusion, and economic waste. Though public lands are subject to the control of Congress and their disposition is directed by the legislative branch of the Government, the States, by the enabling acts and the constitutions formed under them, have generally been delegated control over the appropriation of waters flowing within their boundaries, subject to certain paramount rights of the general government with reference to navigation and to the rights of sister States in interstate streams.

Thus application must be made to the State to obtain the right to divert the water of a stream, but the right to convey across public lands is granted by the Federal Government. The public interest has in many cases unquestionably suffered because neither federal nor state officials have exercised authority to control situations that have arisen.

Fortunately many state and federal officials have come to realize that the solution of this difficulty lies not in contention but in cooperation. Much has been accomplished in closing up the gap between federal and state authority in which both have in the past claimed jurisdiction and neither has exercised effective control.

The Business Library

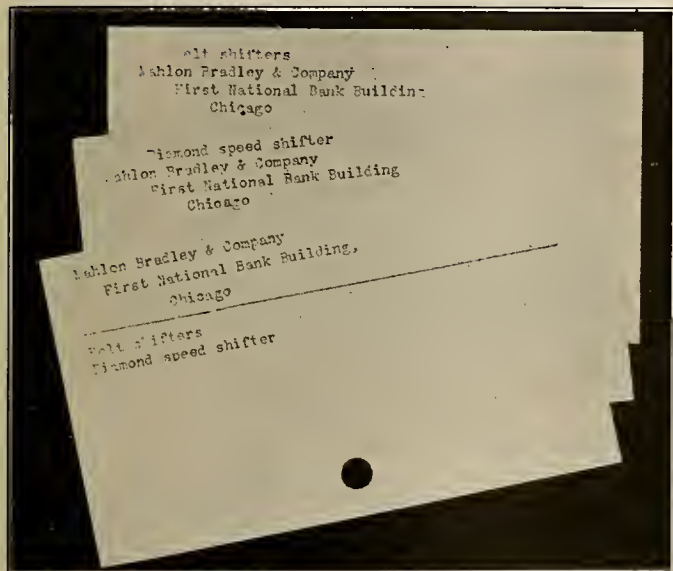
BY LOUISE B. KRAUSE

(What do you do with the trade catalogs which come through the mail? Are your photographs in such order that you can lay your hand on the data you want without a day's hunt? What happens to the cuts which no business establishment is without? The picture of order and system in your office and desk which this article suggests will lead you to revising present systems at once. The author is librarian with H. M. Bylesby & Company, Chicago. Attention is called to the fact that written permission is required to reproduce these articles.—The Editor.)

TRADE CATALOGS, PHOTOGRAPHS AND LANTERN SLIDES—THEIR FILING AND INDEXING

Trade Catalogs —

Several methods for filing and indexing trade catalogs have been advocated by various writers, but the most generally approved practice is to file in legal size vertical file cabinets, with a shelf to accommodate large bound volumes which are too bulky to go into the drawers and whose disposition



Catalogs are as a rule best filed under the name of the company—but these should be subject indexed as well. It takes less time to make a working index than to look through all the catalogs in question.

on shelves instead of in file drawers can not be noted by a symbol on the index card.

All trade catalogs should be filed alphabetically by the names of the firms issuing them, rather than under subjects, because often a single pamphlet, or volume, may list a variety of materials which can not be classified under a single subject name, thus avoiding numerous cross subject references.

Engineers are prone to endeavor to apply a Decimal Subject classification in filing trade catalogs, with the result that they fall into many intricate difficulties. However, small offices using only a few trade catalogs on special subjects can file under subjects with other library material if desired. (The organization of an alphabetical subject file for miscellaneous data will be fully described in a later article in this series.) All trade catalogs filed under the names of the firms should be subject card indexed, because it takes less time to make a working index than it does to look through various catalogs to find desired information when there is no index.

The method of indexing should be as follows: there should be a card made for the name of each

firm issuing the catalog, and the address of the firm may be added to this card in order to use it as a mailing list if desired. The subjects, i. e., specific names of merchandise, which the catalog covers and any well known trade names, should be written on the face of this main card (see illustration) and additional cards made for the subjects and any important trade names, and all of the cards should be filed in a single alphabet. A Cutter number (which will be explained in detail in the article on cataloging) may be put on each index card in order to facilitate the alphabetizing and quick location of individual trade catalogs. The subject index in Thomas' Register of American Manufacturers, an invaluable tool to purchasing departments, is a great aid in selecting subject names to be used in the trade catalog index.

Photographs —

Photographs are important sources of information for any business firm, as they visualize printed

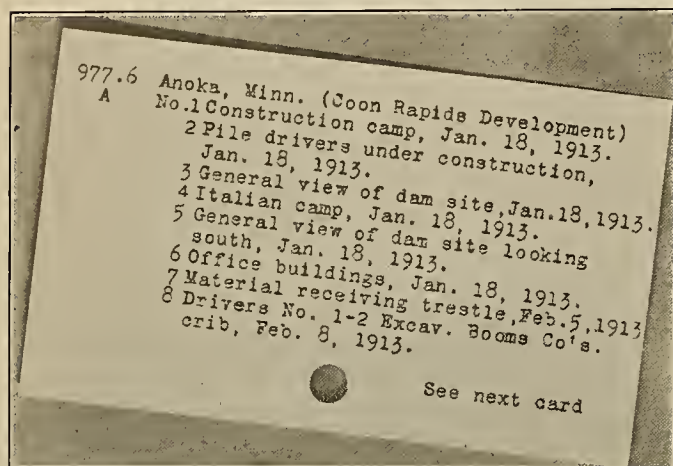


Photographs may be readily filed after mounting. The Dewey decimal classification for each state, with the initial of the city below, provides a convenient method of filing.

or written descriptions and make an accurate and unchangeable record which does not permit of any misunderstanding, as is sometimes the case in reading a printed account. Every industry should have a photograph file illustrating the various aspects of its products or the installations and construction for which it is responsible and which may be supplemented by any photographs which can be obtained on similar work done by firms other than its own.

Banks and investment houses should have photographs of all tangible properties on which they issue securities, as they have been found to be of great aid in making a stock and bond offering concrete in the mind of possible customers.

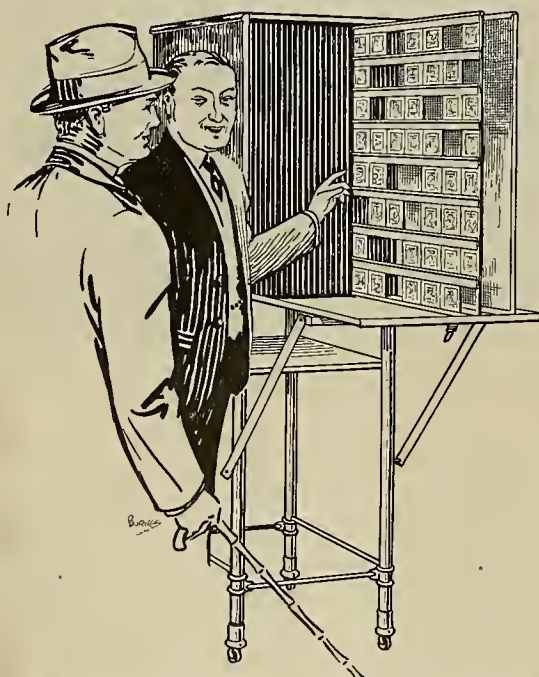
Photographs are best filed by mounting singly or in groups on a standard size photo-mount board 11 by 14 inches and put into architectural size vertical file drawers. A dry mount process by the use of gum tissue and a hot iron is much to be preferred to the ordinary method of mounting, as photographs expand when wet and shrink in drying, thus subject-



The card index of photographs gives the file number and a record of the photographs in that series, giving as well the date on which each was taken.

ing the mounting board to more or less warping unless heavy pressure is used.

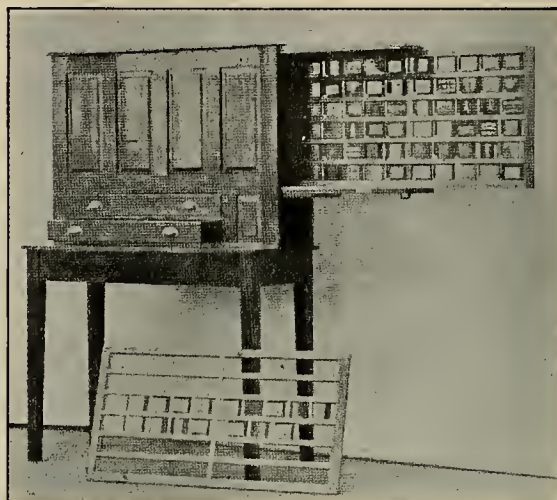
Photographs for business purposes may be filed geographically or by subjects, according to the use which is to be made of them. An engineering firm building structures in different parts of the country file their construction photographs under the name of the state and city in which the work is done; all the cities of a single state are arranged in alphabetical order under the state name. The individual



The vertical filing system for lantern slides. This is designed on the sectional unit plan and may be added to when necessary.

photograph boards are numbered in accession order which makes the photograph of latest date the highest number under each city.

In order to avoid writing the name of the state and the name of the town on the corner of each photograph, this particular library uses on each board the Dewey Decimal Classification history number for each state with the first letter of the name of the city below this decimal number, to which is added the accession number of the photograph. This combined number is used in the corner of the index card on which is also entered the name of the city followed by the accession number of each board and the title of the photograph with the date on which the photograph was taken, as shown in the illustration on the preceding page.



Slides are filed either in similar fashion to cards in drawers or in vertical cabinets provided with grooves which permit of the examination of slides without handling.

Lantern Slides —

There are two methods of filing slides. One is to file slides in a cabinet containing drawers similar to a card catalog case, the slides being filed horizontally rather than vertically. The other method is to use a specially designed filing cabinet containing sliding file leaves which pull out at right angles to the cabinet, which is designed on the sectional unit plan for growth; the leaves have each a capacity of about fifty or sixty slides which are held in place by means of channel grooves which provide for examination of the slides without handling, and also permit of quick removal of each slide as needed. Complete descriptions of such cabinets may be obtained from the Multiplex Display Fixture Company, St. Louis, Missouri, and from G. S. Moler, 408 University avenue, Ithaca, New York. Both makes have been satisfactorily used by a number of business organizations.

The drawer method of filing slides costs less than the cabinet with sliding file leaves, and also takes up less space. It has been found in the experience of libraries handling large numbers of lantern slides which are used freely that they are not as fragile as they appear to be; they do not break easily and can be fingered as rapidly as a card index file in a similar drawer. A piece of white paper can be easily slipped behind the slides in the drawers to bring out their details when they are being consulted.

Lantern slides may be classified and card indexed for business purposes in the same way that photographs are and care should be taken to have the file number and title of the slide plainly lettered along the top edge of the face of the slide.

Collections of lantern slides for art and architectural purposes require more elaborate classification and cataloging but such requirements do not come within the scope of this series of articles.

In some business libraries where the slides are loaned out of the city it may be advisable to index them on a 4 by 6 inch catalog card, instead of the 3 by 5 inch card, in order to allow room to paste on it a photograph of the lantern slide which will show its detail when the slide itself is not immediately available. All lantern slide negatives should be filed

separately, in drawers provided for their exclusive use.

Cuts —

Half-tone, zinc and electrotpe cuts may be classified in the same way that photographs are, but filed in flat drawers. A reduced photograph of the cut may be pasted on the index card similar to the plan noted above for lantern slides.

Maps —

Business firms having large collections of maps which need to be specially filed and recorded will find helpful suggestions in a small pamphlet entitled "Making Maps Available," by Beatrice Winsor, published by the American Library Association, 78 East Washington Street, Chicago, Illinois, price five cents.

Internal Combustion Engine on the Pacific Coast

BY GEORGE DOW

(The use of the Diesel engine for marine propulsion is destined in large measure to make possible the maintenance of the American merchant marine. Shipping and ship building have come to play an important part in the electrical industry of the Pacific Coast and the following article on the adaptation of the Diesel engine to Pacific Coast needs is of particular interest to the West. The author is of the Dow Pump and Diesel Engine Company of Oakland, Cal., and the paper formed part of the discussion of this subject before the San Francisco Section, A. S. M. E.—The Editor.)

The Diesel Engine from Europe

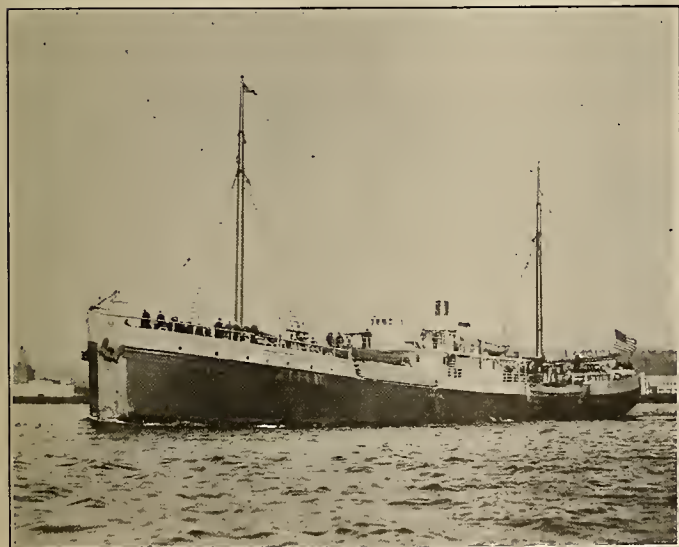
In 1911 a vessel flying under the Danish flag entered our harbor and discharged cargo at one of our docks. The newspapers announced that a new ship propelled by a new type of engine had entered our port after making a most successful voyage from Copenhagen, Denmark. The local shipping world and the engineering profession crowded into

the cylinder by ignition through the temperature produced by the high compression of confined air, thereby effecting a fuel economy of approximately one to six over the steam driven vessel. We also heard that the motorships made their way from Denmark and Sweden to the Pacific Coast and thence to the Orient and back again without any trouble and in a perfectly satisfactory and efficient manner.

We soon decided that the European built Diesel driven vessels which visited our shores had passed the experimental stage and were a success, and would soon offer fair competition to our steam ships as cargo carriers.

The Evolution of the Semi-Diesel

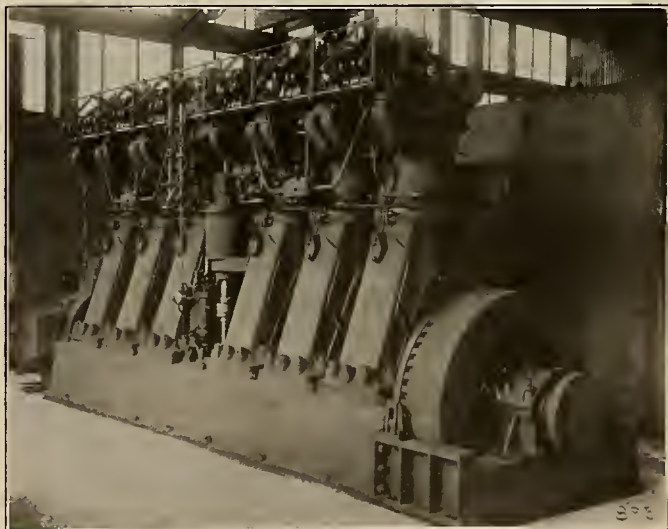
In 1916, when the demand for bottoms was so very urgent and every possible means was bent toward producing ships and equipping vessels to



The motorship "Libby Maine"—a 2000 ton wooden ship with Diesel engines. Her record for speed and endurance has proved excellent.

the engine room of the "Siam" to get acquainted with the new oil engine. Thus the shipping men of the Pacific Coast were introduced to the Diesel.

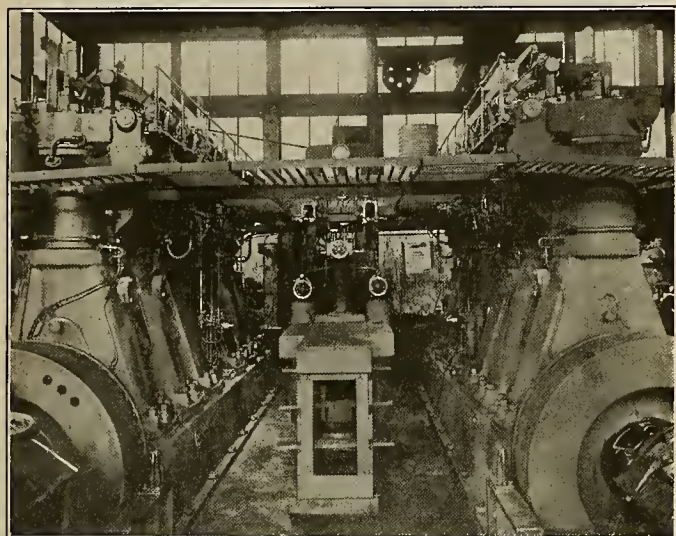
Every few months, and later every few weeks, a vessel propelled by the Diesel type oil engine visited our coast, and our interest was stimulated to a degree when we learned that the Diesel engine used in marine propulsion burned heavy oils directly in



Single unit Dow marine Diesel engine. The principle of the Diesel engine is quite distinct from the semi-Diesel, the chief similarity being in the use of fuel oil.

carry our products to Europe and to build still more ships to overcome the German submarine menace, the great problem of obtaining machinery presented itself. Ships had to be built quickly, with the materials available. Ships were desired which would operate economically, giving large cruising radius. Engine manufacturers were building steam engines and steam boilers for large steel ships and could give no time to the building of smaller engines for smaller ships or for commercial interest in general. The average ship owner was glad to get whatever he could.

The wooden sailing vessel was decided upon to meet the great emergency, and the so-called semi-Diesel type of engine was adopted as an auxiliary,



Engines of the "Libby Maine" on the test block. These are a pair of 425 i.h.p. Dow direct reversible heavy duty marine full Diesel type engines, connected when installed to Falk Reduction Gears through Nutall Flexible Couplings.

but subsequently used as a full powered propelling unit, as the case may have been. Thus a practice new to the shipping men of the Pacific Coast and untried by the manufacturers came into vogue. In the mad rush and excitement of the moment the semi-Diesel proposition associated ideas with the successful full Diesel practice of the Europeans. The term Diesel suggested economy and the use of our plentiful supply of heavy oil as a fuel, with the result that the semi-Diesel gained great popularity.

A Distinct Field

The Diesel engine practice is not that of the gas engine nor of the steam engine (although the Diesel indicator card is more nearly like a steam card than a gas engine card); it is positively and absolutely Diesel engine practice—a field in itself. American engineers acquainted with the gas engine are too apt to consider the empirical formulae of the gas engine applicable also as empirical formulae in Diesel engine design.

In many cases engineers who were new at the Diesel game possessed the idea that they could make great improvements over the standard accepted European practice, chiefly in lightening parts, cheapening material and eliminating certain expensive processes in manufacturing. In Diesel engine design the European engineer is still our master and we

must accept his practice until our experience warrants reasons for changes.

The lack of properly trained operating engineers has caused considerable trouble, although the Dow Pump and Diesel Engine Company has proven that any marine engineer who is young and who is willing to accept new ideas, or reason old ideas in a new light, as applied to a prime mover, will with very little difficulty and in a comparatively short time be made into a very efficient and successful operator of 4 cycle full Diesel engines.

The failure of one has affected the successes of others, for the good suffer as well as the bad in new fields of endeavor. For this reason, largely, the world has been prejudiced in the adoption of the internal combustion engine as a means of ship propulsion. Shipping men must recognize the distinction between the so-called semi-Diesel and the full Diesel principle and judge accordingly. The term semi-Diesel was invented for commercial reasons only, as in the hands of salesmen it linked up the idea of semi-Diesel to the full Diesel and caused the buyers of marine equipment and shipping interests in general to believe that the semi-Diesel was a modified or improved type of the Diesel principle, when as a matter of fact it approaches this principle in no way, except perhaps that heavy oil is used as a fuel.

The shipping world has had its experience with hot head engines and with auxiliary powered ships. A good many types of American built Diesel engines have been installed and tried out and have shown their weak and strong points. Marine engineers have had their opportunities to prove their skill in operating them. The time is fast approaching when the fair-minded ship owner can see that, after all, the American built combustion engine will win for itself a front rank position as a prime mover in ship propulsion.

A Pacific Coast Installation

An installation watched with unusual interest on the Pacific Coast is the motorship "Libby Maine." The "Libby Maine" is a 2000 ton wooden ship of very rugged heavy construction, built especially for severe Arctic service. She is 240 ft. long, 43 ft. beam, 24 ft. molded depth, and has a mean draft of 22 ft. 8 in. She is engined with a pair of 425 i.h.p. Dow direct reversible heavy duty marine full Diesel type oil engines, connected to Falk Reduction Gears through Nutall Flexible couplings. Each unit is tied to an engine bedding designed to give the maximum stiffness, and greatest security against deflection. Heavy timbering securely bolted to the ship's frames run in single lengths the entire length of the engine unit. The Nutall flexible coupling is placed between the main engine and reduction gear to relieve any possible strains between these units, as well as to act as a float. The reduction gear and thrust block are bolted to a single heavy cast iron sub-base. By the use of the reduction gear the most efficient engine speed of 250 r.p.m. and the most efficient propeller speed for this size of ship, 100 r.p.m., is obtained. The Nutall flexible coupling possesses the particular advantage that in case any or all of the driving springs are broken, the coupling

still serves its purpose in that the drive may operate through the then engaged spring lugs.

For the past six years the Dow Company has been building engines of this type, and has proven them to be a success and well adapted for burning our California crude oil of 16 and 17 gravity as a fuel. Two years ago the marine type of direct reversible engine was perfected, using all the highly developed and specialized features and construction of the original Willans & Robinson design. It is engines of this type with which the "Libby Maine" is equipped.

Details of Installation

The engines installed in the "Libby Maine" are of the 6 cylinder open "A" frame type of construction. Six cylinders were used in order to give maximum flexibility and positive starting positions, and the "A" frame design was adhered to because it afforded the greatest accessibility to the bearings and pins. Marine engineers are anxious to know where their pins and bearings stand and feel more secure when they are able to feel parts subject to heating.

The cylinders are separate cylindrical castings; cylinder leads are of standard box construction and pistons are of the long trunk type. The crankshaft is in two sections, the forward and after section being interchangeable. The lubricating system is controlled by drip oilers, the oil being measured into individual positively timed oil pumps attached to each "A" frame. One plunger of this pump supplies the piston lubrication and the other the piston pin. The main bearings are lubricated by ring oilers and the crank pin by centrifugal oil rings.

The operation of the entire engine is controlled by three levers centralized at one station. A novel feature of this installation is that one man is able to control both engines from one platform. Even in the treacherous waters of Bering Sea this control was absolutely responsive to the captain's wish.

Two levers are used to govern the action of the engine, while the reversing mechanism is manipulated by the third lever. Reversing is accomplished by the single movement of a vertical sliding cam, actuated by an oil compensated air piston, which automatically lifts the cam rollers clear of all cams, then slides the camshaft to the desired position and finally returns the cam rollers to the cams, thereby giving the proper timing of the valves for the new direction of rotation.

Air pressure is then applied to the pistons of the engine through the air starting valves by a single movement of the control lever until momentum is acquired, when another single movement of the same control lever automatically cuts off the air pressure and admits the fuel oil to the cylinders. The entire mechanism is thoroughly interlocked to guard against any false move on the part of the operator. Automatic locking devices block the execution of any movement not made in the proper sequence. The speed of reversal is controlled by the pressure of the air applied to the air piston of the reversing cylinder and the regulation of the velocity of oil displacement from one side of the piston to the other.

In order to obtain flexibility of operation, economic use of starting air, and added security against a shut down of the entire unit, two control levers are provided, one lever for each set of three cylinders.

The general characteristics of the engine are: i.h.p. 425, bore 12 in., stroke 18 in., crankshaft diameter $7\frac{1}{2}$ in., speed 250 r.p.m., floor space 20 ft. by 5 ft. 1 in., height above center of crankshaft 8 ft. 10 in., approximate net weight 125,000 lbs.

Before installing in the ship the engines were completely erected in the shops and were thoroughly tried out. A 72 hour continuous test run was given each unit, during which the fuel economy averaged .412 lbs. per B.h.p. hr. or .308 lb. per i.h.p. hour.

Records in Practice

After installation at the Standifer Construction Company's yards at Vancouver, Washington, after only a few hours dock trial, the "Libby Maine" proceeded to Seattle and loaded her cargo for Bristol Bay. A non-stop record run was made to the entire satisfaction of Capt. Herre, the engineers, and the officers of the Libby Company. Some very difficult maneuvering was necessary in the dangerous Arctic waters, but the greatest ease of control was experienced at all times.

An ideal trip from Seattle to Honolulu and return to San Francisco was experienced and a record in fuel economy made. Extracts from the official log indicate the following:

Fuel oil consumption.....	259.5 barrels
Total distance	2440 miles
Time of voyage	14 days, 18 hrs., 15 min.
Average economy of 4.46 gal. per nautical mile	
Average speed	7 knots per hour

From San Francisco to Seattle very heavy weather was encountered. The chief engineer reported that the screw was out of the water half of the time, but no racing occurred at any time due to the perfect action of the governors.

Not at any time in 15,000 miles of travel had a tow line been drawn from her decks, but the law requires a tow in bringing a vessel up the Oakland Estuary, so here the "Libby Maine" suffered her first humiliation.

In all of the six years of Diesel engine experience of the Dow Pump and Diesel Engine Company not one single cylinder head, nor one single piston has proven defective or given the least trouble.

The engines of the "Libby Maine" are an example of approved European practice adapted to the needs of the Pacific Coast and stand as a milestone of progress in the use of the internal combustion engine as applied to marine propulsion.

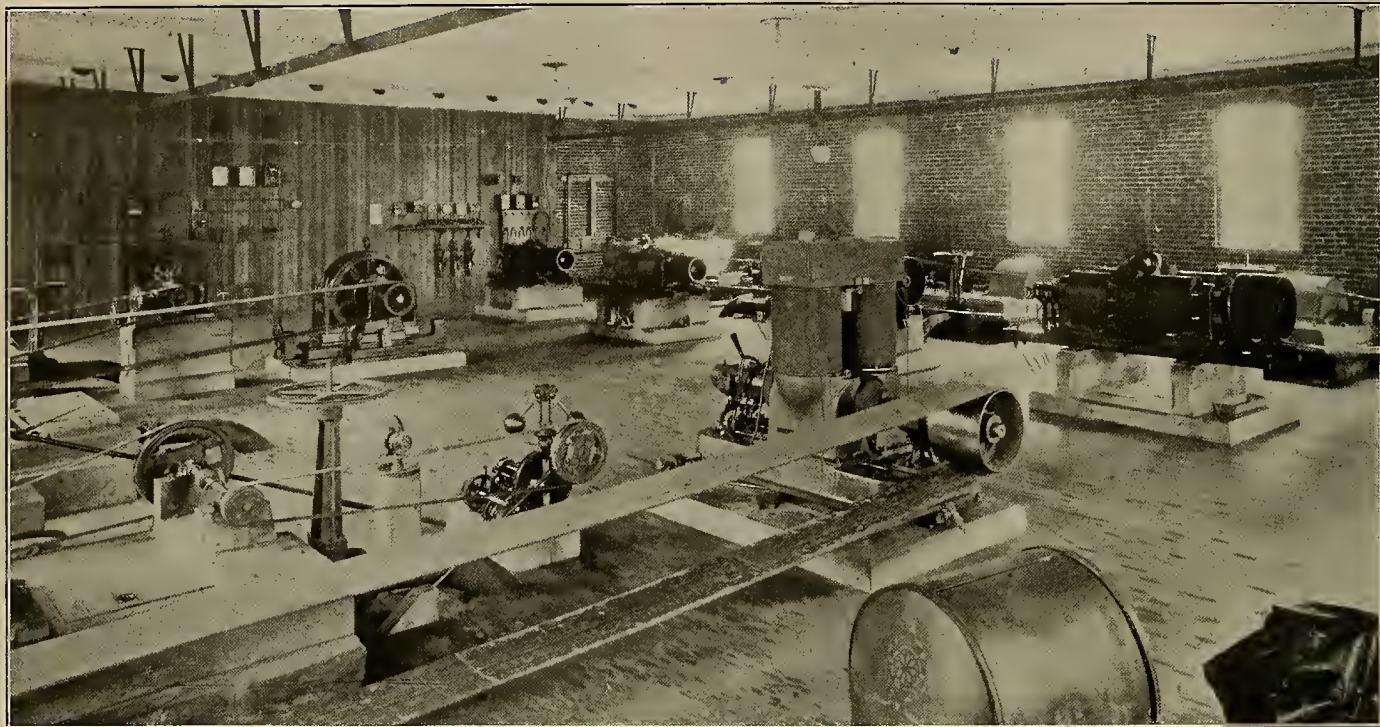
ELECTROCUTIONS AT LOW VOLTAGE

It is not necessary to connect yourself with a 50,000 volt line in order to be electrocuted. Experiments have proved that low-pressure electricity in sufficient quantity can be fatal by reason of certain effects upon the heart. One hundred milliamperes of alternating current at a pressure of 100 volts would kill a dog in a few seconds, while 400 to 500 milliamperes would be necessary in the case of direct current.

PRACTICAL LESSONS IN ELECTRICITY

BY H. H. BLISS

(Do you know the principles of operation of the electric apparatus with which you work? This course in the elements of practical electricity is particularly designed to meet the needs of those associated with the electrical business who wish to refresh their memories in the fundamentals. Supplementary material is offered by the Extension Departments of the Universities of California and Oregon. Any desiring to enter the course at this time will be furnished back copies.—The Editor.)



An early water power plant, built on Hunter Creek, Colorado, in 1888. Note the bipolar d.c. generator in the foreground, the multipolar machine at the left and the peculiar field arrangements of the generators near the brick wall.

ARMATURE AND FIELD WINDINGS

Of all the types of generators, the simplest is the alternating current magneto, which is used for ringing telephone bells and for ignition in gas engines. The magnetic flux is supplied by one or more stationary permanent magnets of horseshoe shape. The armature generally consists of a single coil wound upon an iron core, which revolves between the magnet poles. One end of the winding may be

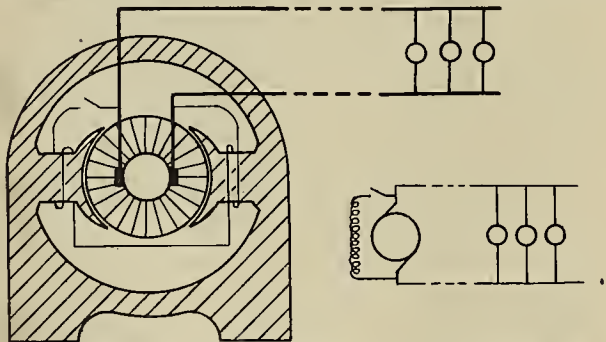


Fig. 1.—Shunt generator. Coils of small wire on the magnet poles are connected in multiple or shunt with the load.

“grounded” (connected to the metal of the armature) while the other is connected to the external circuit through a sliding contact.

All other generators have electro-magnets for producing the “magnetic field” or flux. The wires which carry the current around these magnets constitute the “field winding.”

The magnets are “excited” by sending direct current through these windings, the current being produced either by the generator itself or by some external source. Direct current generators are almost always “self excited,” while a.c. machines are “separately excited” by the use of small d.c. generators called “exciters.” A few alternators have special arrangements for producing small amounts of direct current, thus saving the expense of an extra machine.

In Fig. 1 is shown the simplest arrangement for self excitation, a direct current machine with the field winding connected in multiple or “shunt” with the load. The diagram on the right is a preferable way to represent the same arrangement. Many turns of fine wire are used, which offer enough resistance to limit the field current to a small value, and yet give sufficient “ampere-turns” almost to saturate the iron with magnetism.

When the machine is stopped the current dies out of the shunt field and the magnetism disappears,

with the exception of a small amount which is known as "residual magnetism"; that is, the iron has to a slight extent the characteristics of a permanent magnet. When the generator is again brought up to its running speed, it is found that a low voltage is produced, and if the shunt field switch is then closed, a small current is sent through the coils. This increases the magnetism and raises the voltage, which comes up, little by little, to the pressure for which the machine is designed.

To control the electromotive force of a generator, it is customary to insert a variable resistance

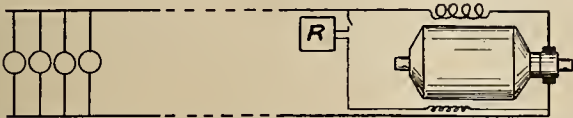


Fig. 2.—Compound wound generator. The load current passing through the series coils tends to raise the generated voltage as the load increases. The rheostat in the shunt circuit enables the operator to change the voltage at will.

or "rheostat" in the circuit of the winding. Thus the current and flux can be altered at will, and hence the voltage, which depends on the strength of the magnets, can be raised or lowered within wide limits. (See the rheostat, R, in Fig. 2.)

An additional feature of the field winding of most d.c. generators is shown in the "series winding" in Fig. 2. A few more turns of wire are put around the magnet poles and this wire (which is made of large size) is connected in series with the load. The additional magnetism thus produced raises the generated voltage as the current increases, and thus compensates for the increased "line drop" at heavy loads. A generator thus equipped is said to be "compound wound."

The field coils of an alternating generator are connected to the exciter through a rheostat. If the alternator field revolves, it is necessary to get the



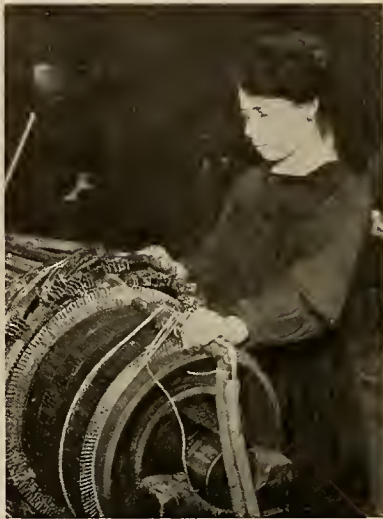
Voltage regulation by the shunt rheostat is sometimes not sufficiently accurate. This series rheostat and ammeter are used to keep the current constantly equal to 20 amperes in the 600 watt gas filled lamp used in many moving picture projectors. What is the lowest possible generator voltage for this service?

current to and from the windings through sliding contacts on "slip rings." This is preferable to using sliding contacts for the generator current, which is usually at high voltage and of much greater volume than the exciting current.

Armature Winding.—Direct current generators usually have drum shaped armatures, built of many thin circular leaves or "laminations" of iron or steel. The wire is placed in slots cut lengthwise along the cylindrical surface and connected at numerous points to the copper commutator bars.

In Fig. 3 is shown a very simple winding for a "bipolar" (2 pole) machine having 6 slots in the

armature, 12 inductors and 6 commutator bars. The letter B indicates the bar in contact with one of the brushes—let us say the "positive" brush, or the one at which the current leaves the armature. Then the current enters the winding at A, and flows along the wires to inductors numbered 1 and 7, both of which are under the influence of the N pole. Obviously, the machine must be turning in such a direction that voltage in wires under the N pole is directed into the paper, or away from the observer. Similarly, the inductors under the S pole must urge the current "out" or toward the observer.



This shows how the formed coils are placed on the armature and the terminals connected to the risers from the commutator bars.

Now we must imagine a wire across the back of the armature which carries the current from the far end of inductor No. 1 to the far end of No. 2. The pressure generated in No. 2 then assists that of No 1, and the current is forced along the wire shown, across the front end of the armature, to inductor No. 3, passing a commutator bar which is inactive because out of contact with either brush. The current flows "in" along No. 3, across the back of the armature to No. 4, across the front to No. 5, then across the back to No. 6, finally reaching bar B and leaving the armature. Six inductors in series have

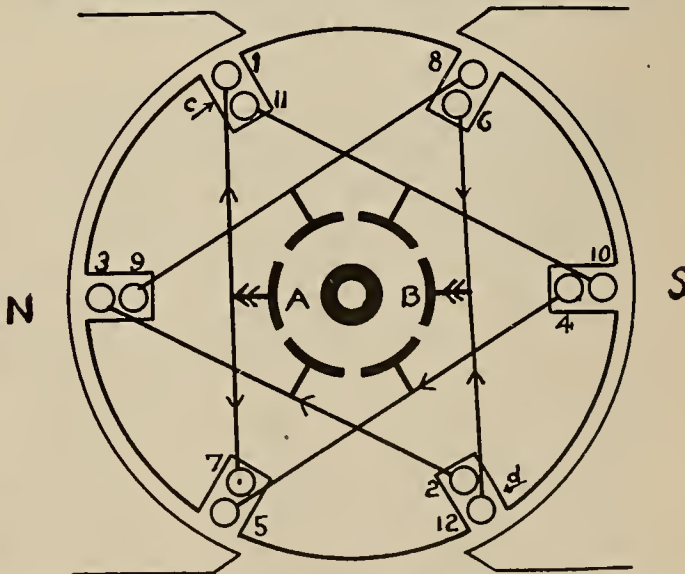


Fig. 3.—Armature of bipolar d.c. generator seen from end of shaft. Note connections of inductors (in the slots) to each other and to the commutator bars. Other interconnections at the other end of the armature are invisible in this view.

added their voltages, so that if the average pressure induced in each is .9 v., the machine generates 5.4 v.

The other inductors, commencing with No. 7, and working through Nos. 8, 9, 10, 11, and 12, perform a service exactly similar to that of the first set, producing a voltage of 5.4 in parallel or multiple with the first voltage considered. If the current is 5 amperes in each wire, the total current sent out of Bar B is 10 amperes. Thus we have the armature current twice that in one inductor, and armature voltage equal to the product of half the inductors times the average e.m.f. in one.

Generators with 4, 6 or more poles are not uncommon. The armatures may be so wound that there are only 2 parallel paths for the current or so that there are as many paths as poles, or with other numbers dependent upon variations in the methods of connection. With the "lap" or "multiple" winding there are at least as many paths as poles, and there must be as many brushes as poles. With "series" or "wave" winding there are, in general, only two parallel paths, and there may be either 2 brushes or as many brushes as poles.

There are often more than 2 inductors in one slot, especially in small machines. This necessitates cross connections on the front end of the armature in addition to those running to the commutator bars. Referring to Fig. 3, the wire might run "in" along the top of slot c, then across the back and "out" along the bottom of d, then across to slot c again (avoiding the commutator) and thus through c and d several times. The coil may be wound on a "form" and taped and varnished before being put upon the armature, and this is the usual practice for "multipolar" machines (having 4 or more poles).

The armature of Fig. 3 could be made to produce alternating current by taking away all the commutator bars except A and B and changing each of these to a "slip ring," so that it would be continuously in contact with the same brush.

RINGING DEVICE FOR TRANSMISSION LINE TELEPHONE

BY E. L. BLAINE

(Telephone systems used in conjunction with heavily loaded transmission lines often experience considerable difficulty in the ringing of the signal bell. A device which most satisfactorily remedies this condition has been worked out in the Northwest. The author is substation foreman, of the Spokane and Inland Empire Railway Company at Spokane, Wash.—The Editor.)

In order to facilitate ringing over a heavily loaded transmission line telephone system, the scheme as outlined below has been in use for several months by the S. & I. E. Railway over forty miles of line between Spokane, Washington, and Hayden Lake, Idaho, with entire success.

This telephone line is a complete metallic circuit of No. 10 hard drawn copper wire and equipped with 1600 ohm instruments and magneto generators, and is used for telephone communication only.

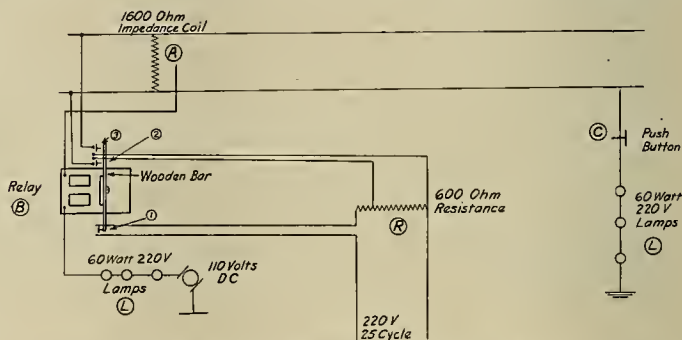
At the Spokane end of the line, twenty-five cycle energy is available for ringing purposes. For this,

however, could be substituted a pole changer in case of a similar installation where proper ringing frequency is not otherwise obtainable.

The actual connections are as shown by the accompanying sketch. 1600 ohm impedance coil (A) is connected across the telephone line and connection is made from the middle point of this coil through a 1600 ohm relay (B), and lamp resistance (L), thence to one side of a 110 volt d.c. circuit, the other side of which is grounded. An outside wire of Edison three wire circuit using grounded neutral would meet this requirement.

The relay (B) is supplied with contacts which upon the closing of the relay, close the 25 cycle ringing circuit to the two sides of the telephone line through contacts (2) and (3). Contact (1) at the same time closes the 220 volt 25 cycle circuit across a 600 ohm resistance (R), to the opposite side of which is attached a wire to the contact (3). A wire to the contact (2) is attached at an intermediate point, to give a voltage suitable for best results in ringing.

Ringing is accomplished by means of a push button (C) placed at each point where ringing connection is desired. This push button is connected



CONNECTIONS FOR BELL RINGING DEVICE

Ringing is accomplished by ringing the push button at C which closes the 110v. d.c. circuit through the relay B and at the same time the ringing contacts, 1, 2 and 3.

from one side of the telephone line to the ground. Closing this button closes the 110 volt d.c. circuit through the relay (B) and closes ringing contacts (1), (2) and (3). Releasing this button opens the relay circuit and contacts (1), (2) and (3). Control of the relay operation and consequent ringing is thus in the hands of the person operating the push button.

Owing to the fact that this telephone line is carried on the same pole line as the 600 volt railway feeders, it was found necessary to place a resistance bank (L), consisting of three 60 watt 220 volt lamps connected in series, in the main relay circuit and in each push button circuit to protect against burning out of the telephone instruments in case of accidental contact between telephone and power circuits.

In cases where such protection is not necessary, a few cells of battery and a low resistance relay could be substituted for the 110 volt circuit and for the relay (B).

The relay (B) is a standard telegraph relay with 1600 ohm coils. The contacts (1), (2) and (3) are mounted on a light wooden cross bar and attached to the armature of the relay.

SPARKS—Current Facts, Figures and Fancy

(It may surprise you to learn that you ought to be in prison; that a professor of elocution invented the telephone and that a woodpecker recently held up a train; but do you realize that in view of the destructiveness of matches you ought to cook by electricity? We can stop fires, but as they can't stop rain in England, they take out insurance policies against it. These and other irrelevant items from all over the world are collected here for the delectation of the curious reader.—The Editor.)

"From office-boy to manager" is not a necessary recipe for success in any line. Bell, the inventor of the telephone, was a professor of elocution; Ingersoll the dollar-watch man was a stationer, and Eastman the kodak man was a bank clerk.

* * *

Movies on the ceiling are an innovation whereby the Red Cross is entertaining bed-ridden soldiers. By means of a special machine, the pictures are projected on to the ceiling where they may be enjoyed by patients who are not allowed to sit up.

* * *

The Department of Communications in Tokyo will install in each public automatic telephone a special electric clock. The clock is put in operation by the beginning of conversation, flashing a light so that the speaker can keep track of the cost of his loquacity.

* * *

A New York electrical and radio manufacturing concern will shortly install a complete radio telephone system between their factory and several branch stores, thereby relieving some of the congestion on the regular telephone lines connecting these units of the organization.

* * *

Because the long distance telephone between Tokyo and Osaka is in such demand that you have to wait several hours for your turn, the government is going to install a radio telephone operated over the ordinary wire telephone. The system will be open for public use in the near future.

* * *

During the war the A. E. F. Signal Corps operated 126,562 miles of lines, running through 14,854 telephone stations and 296 head central offices. At the time of the Armistice there were 1,000 officers and 27,000 other members of the Signal Corps on duty with the armies at the front.

* * *

The great majority of the inhabitants of the United States are liable to a \$500 fine, six months imprisonment, or both. For the benefit of those who have escaped so far, we will explain that these penalties are provided in the Federal penal code for persons who issue checks, notes and so forth for a sum of less than one dollar.

* * *

A railway tunnel under the Straits of Gibraltar is now being advocated. This, together with the

proposed tunnel under the English Channel and the recently completed one under the Pyrenees from Aix to Puigcerda, would seem to indicate that something has given the public a taste for subterranean travel; air raids, perhaps.

* * *

The illumination of air ports is a subject which was discussed at the recent Pan-American Aeronautical Congress. The plan under consideration involved the lighting of the ground in such a way as to bring out the essential features—runways, wires, buildings and boundaries—so that a flier landing by night could clearly see the field and its available landing space.

* * *

During the year 1918 there were 899 fires in Ontario caused by the careless use of matches, with total losses amounting to \$234,525. Our informant says matches should be kept out of the way of children, but as no self-respecting child ever yet permitted himself to be outwitted by his parents in things of that kind, we suggest electricity as the only practicable solution of the difficulty.

* * *

Rain is now classed with burglaries, fire and accidents by British insurance companies, and vacation-seekers may take out policies against it. This opens up a fertile field of possibilities: Why not institute sun-insurance for California farmers during the rainy season, and even insure orchards against caterpillars, birds, small boys and other accidents?

* * *

A hold-up by a woodpecker is the latest in railway records. Attracted by the relay apparatus of a signal box—whether for nutritive or building purposes is not related—the bird pecked at the wires until they short-circuited. At once the signal blade swung up, denoting danger, and the engine-driver of the next train waited patiently for a whole hour before he suspected that the signal was not authoritative, and investigated.

* * *

The electrical section of the Disposal Board is going to place on the market certain articles which until now have been confined to military and naval circles. One is a daylight signaling lamp, another an electric mine exploder. The first might conceivably be utilized by civilians, but somehow the idea of the second as a parlor toy, for instance, does not appeal to us.

PERSONALS

H. L. Garbutt, for the last six years manager of the Line Material Section of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., who has recently been appointed manager of the Supply Division of the Westinghouse San Francisco office, is already well known on this coast through his effective work in experimentation with insulator design and transmission line problems. In 1908 Mr. Garbutt became a part of the sales organization of the Drew Electric & Manufacturing Company of Indianapolis, handling various types of overhead line material. He remained with the company until 1909, when he entered the Supply Department of the Chicago office of the Westinghouse Company, as line material specialist. He served in this position until 1913, when he was made manager of the Line Material Section, with offices at East Pittsburgh, Pa., remaining there until his recent promotion.



H. H. Jones, manager of the San Diego Consolidated Gas and Electric Company, is a recent San Francisco visitor.

C. K. G. Billings, the New York electric light and gas magnate, has been staying in San Francisco with a large party.

Elgin Stoddard, manager for Charles C. Moore & Company, San Francisco, was a recent visitor at the Seattle office of the company.

C. O. Yoakum of Portland, Ore., district sales manager of the United States Shipping Board, is among recent visitors to San Francisco.

H. D. Howell, district manager of the Westinghouse Lamp Company, Denver, has just returned from an extended trip through the east.

R. M. Martin, of the Benjamin Electric Company, has returned to Seattle after visiting Salt Lake City and the Inter-Mountain country.

R. M. Cole, of the Seattle office of the Economy Fuse Manufacturing Company, is making a trip through eastern Washington, Idaho and Montana.

J. F. NePage of NePage, McKenny Company, electrical engineers and contractors, Seattle, has been visiting the San Francisco office of the company.

Roy Worth of the Pacific States Electric Company, Seattle, has returned to Seattle after two weeks spent at the Shriners' convention in Indianapolis.

C. C. Hillis, formerly president of the Electrical Credit Association, has returned from the East where he has been attending the meeting of the association.

D. D. Faris, manager of the marine department of the Westinghouse Electric & Manufacturing Company, is among the recent prominent visitors to San Francisco.

D. H. Foote, head of the Pacific Gas and Electric Company, Hayward, was one of San Francisco's recent visitors. Mr. Foote was accompanied on his visit by Mrs. Foote.

Lieutenant-Colonel Henry M. Byllesby, president of H. M. Byllesby & Company, who served as Purchasing Agent for Great Britain and Scandinavian countries for the American Expeditionary Forces, with headquarters in London, has just been advised that the English Distinguished Service Order has been conferred upon him.

C. E. Grunsky, well-known civil engineer of San Francisco, has returned home from Minneapolis where he has been attending the convention of the American Society of Civil Engineers.

S. G. Jackson, formerly in the electrical contracting business in Berkeley, has returned to California after a year's absence in France and is looking about with a view to new connections.

William Locke, for many years sales manager with the Hazard Manufacturing Company, has joined the forces of Bittmann & Battee, Inc., of San Francisco, and will handle the Hazard line.

Ross L. Mahan, formerly Captain in the Engineer Corps, has returned to San Francisco from France and is now carrying on his work as sales engineer with the Pelton Water Wheel Company.

Willis M. Deming, president and general manager of the Technical Publishing Company, has been at Santa Cruz attending the convention of the California Association of Electrical Contractors and Dealers.

Charles Grunsky, who served in France as Captain of Engineers, has resigned from the army and has returned to the Pacific Coast, where he has resumed his former position under the California Railroad Commission.

J. N. Chamberlin, who for several months has been acting division plant engineer with the Pacific Telephone & Telegraph Company, has been appointed division plant engineer, Central Division, to succeed C. E. Fleager.

J. C. Merriam, Professor of Paleontology, University of California, returns from leave of absence and is named department chairman for the ensuing year. He has been acting as chairman of the National Research Council in Washington, D. C.

J. L. Isaac has recently become associated with the Service Department of the Westinghouse Electric & Manufacturing Company and is successfully bringing before the large users of motors the efficient repair service offered by this department.

F. B. Tough, petroleum technologist of the U. S. Bureau of Mines, with headquarters at the San Francisco office, left San Francisco June 2 to take charge of cooperative work being carried on by the Bureau with the Midwest Refining Company and the Ohio Oil Company in the Wyoming oil fields.

Prof. Leon J. Richardson, who is perhaps best known to electrical men of the Pacific Coast through his recent efficient work at the head of the Military Bureau of the University of California, has been appointed head of the University of California Extension Division. Owing to the broad policy of practical service which has been the aim of our great state universities in this field, there are few Westerners who have not in some measure benefited through university extension work. Many of the readers of the Journal of Electricity



are now taking advantage of the course in practical electricity in which this journal is cooperating with the extension divisions of the Universities of California and Oregon. Prof. Richardson's effective service in bringing together government needs and civilian and military workers through the Military Bureau augurs well for his present work, and the electrical industry is fortunate in the outlook for even wider cooperation from the University under Prof. Richardson's leadership.

Leonard F. Fuller, who has been doing important work with high voltage phenomena in the laboratories of the Federal Telegraph Company at Palo Alto, has severed his connection with that company to accept the position of assistant manager of the Ohio Insulator Company at Barberton, Ohio. The remarkably interesting work accomplished at this laboratory, in which Dr. Fuller had so important a part, has attracted much attention recently from those interested in the handling of high voltages. A recent meeting of the



San Francisco Section A. I. E. E. was held in Palo Alto for the purpose of inspecting this installation, and proved one of the most instructive of the season's gatherings. Stanford University at its commencement a few days past, conferred upon Dr. Fuller the degree of Ph.D. in electrical engineering in recognition of his service along these lines.

Howard H. Douglas, connected with the Reclamation Service, formerly stationed at Minidoka, has been transferred to Rupert, Ida.

A. J. Myers, Pacific Coast manager, Wagner Electric Manufacturing Company, was in Los Angeles recently looking after the growing business of his company in that section.

Robert Sibley, editor of the Journal of Electricity, has returned from Detroit, Michigan, where he has been attending the convention of the American Society of Mechanical Engineers, as representative of the Pacific Coast Sections.

Frank I. DuFrane has resigned after fifteen years' service as Telephone Sales Specialist with the Western Electric Company at San Francisco, to become associated with the Sierra Electric Construction Company, manufacturers' agents at San Francisco.

C. S. Coler, for some years Director of Trades Training with the Westinghouse Electric & Manufacturing Company, has been appointed manager of the company's Educational Department to succeed C. R. Dooley, who goes to join the Standard Oil Company.

F. D. Barrett, formerly commercial manager of the Mountain States Power Company, is now a member of the flourishing Acorn organization of Rathbone, Sard & Company. He is assigned to the Western territory and is handling the company's electric line in the Northwest.

J. F. Kinder has been appointed by the Apex Electric Specialty Company, of St. Louis, as their sales representative at Portland, Ore., for the northern coast district. Mr. Kinder being thoroughly acquainted with the trade in that territory, is particularly well fitted for his position.

Theodore J. Hoover, well known to the scientific world as an international mining expert and also as the brother of Herbert C. Hoover, has been named as head of the mining and metallurgy department at Stanford University. Mr. Hoover will assume his duties in October of this year.

Edward De Nike, formerly chief clerk at Dinuba with the San Joaquin Light & Power Corporation, has been transferred to the accounting department on the company's construction project near Auberry. He is succeeded at Dinuba by H. G. Jobe who has recently returned from France.

Theodore N. Vail, president of the American Telephone & Telegraph Company, has resigned the presidency of the company and assumed the newly-created position of chairman of the company's board, in which capacity he will devote his attention to the larger problems of policy and development. He is succeeded as president by H. B. Thayer, who has been with the company for forty years.

L. J. Corbett, formerly professor of electrical engineering at the University of Idaho and consulting engineer, and for the past year a Captain of Engineers on duty at Washington, D. C., has returned to the Pacific Coast as a special agent of the Federal Board for Vocational Education, San Francisco office, and is engaged in the work of rehabilitation of disabled soldiers and sailors.

Major Charles E. Sholes is the newly elected vice-president, director and general sales manager of the Edison Storage Battery Company, succeeding Harrison G. Thompson who has resigned to organize and conduct the Transportation Engineering Corporation of New York. Major Sholes is particularly well known to the chemical industry, and during the war served as Chief of the Chemical Branch in the Ordnance Department, and as Army Representative before the War Industries Board.

The Casa Del Rey at Santa Cruz, where the Contractor-Dealers of California have just been holding their convention. The convention program was one of singular interest and was interspersed with a number of most enjoyable outdoor social events, for which the location was especially adapted.



Meeting Notices for Electrical Men

(An important gathering in connection with the California Electrical Cooperative Campaign, and the annual meeting of the National Electrical Credit Association are among interesting recent events in electrical circles. The Contractor-Dealers have been active in many sections and the recent Santa Cruz convention has acted as a great stimulus to this branch of the industry.—The Editor.)

California Cooperative Campaign

One of the liveliest meetings ever held by the electrical men of Southern California was staged by the Executive Committee of the California Electrical Cooperative Campaign in Los Angeles recently. Only manufacturers, jobbers, and their salesmen were invited, the purpose being to form a salesman's auxiliary to assist in the work of the California Cooperative Campaign.

The meeting was preceded by a banquet, the arrangements for which were taken care of by A. L. Spring, local Field Representative of the California Cooperative Campaign.

After the banquet Glen Arbogast called the meeting to order, concisely outlined the purpose of the meeting, and announced that D. C. Pence of the Illinois Electric Company had been appointed chairman of the Southern California section of the Salesman's Auxiliary of the California Electrical Cooperative Campaign.

Mr. Pence called immediately on L. M. Harper, manager of the Western Electric Company, who gave a very enthusiastic talk on the work of the Campaign, and who brought out the point that too much time had been given to the manufacturing and engineering end of the game, and not enough to the distribution. He emphasized the fact that the salesmen should encourage dealers to tie-in with the national advertising of the manufacturers by advertising locally and derive the benefit of this great expenditure on the part of the manufacturers for advertising. Mr. Harper said that if the dealer did not wake up to this situation, department stores, who are already realizing the vast amount of business obtainable through tying-in with the manufacturers' national advertising, would take this business completely out of their hands. He heartily endorsed the plan of organizing the Salesman's Auxiliary.

Mr. Pence next called on Dave E. Harris, sales manager of the Pacific States Electric Company, San Francisco, who endorsed the plan and stated that the time had come when the whole electrical industry was united to push along the good work of the California Electrical Cooperative Campaign. He said that they intended to form a similar Salesman's Auxiliary in San Francisco and hoped that the movement would spread through the country. Every one was very much interested in Mr. Harris' remarks in regard to securing an executive to direct the campaign from San Francisco, and all looked for big results from this end.

K. E. Van Kuran, district manager of the Westinghouse Electric & Manufacturing Company, was called on next and

gave a splendid address on the accounting system. He urged all salesmen to study enough accounting to help their dealer install this new system gotten out by the National Association of Contractor-Dealers. Mr. Van Kuran brought out most forcibly that the success of the Campaign rested in putting the dealer on a firm financial basis, and called the salesmen's attention to the flexibility of the system.

A. W. Childs, of the Southern California Edison Company, a member of the Advisory Committee, urged the dealers to put on solicitors in proportion as central stations decreased their sales efforts. There are sixty salesmen successfully working in California under the supervision of the California Cooperative Campaign, and in closing Mr. Childs urged the salesmen to encourage the dealers to take advantage of these solicitors.

A. L. Spring, Field Representative of the California Electrical Cooperative Campaign, brought out in a clear and forceful manner the work of the campaign in the past year. Mr. Spring stated that perhaps the biggest work that had been done was the securing of closer cooperation between the central stations, manufacturers, jobbers and dealers, and also in helping the contractor-dealer to occupy the proper place in the electrical industry. Mr. Spring stated that when he first went into the smaller towns of Southern California he frequently found that the dealer and the central station representative did not even know each other. He arranged to have the men meet each other at lunch and in this way secured much closer cooperation. A great deal has

also been done to eliminate any antagonistic feeling between the dealers. Mr. Spring said he was exceptionally gratified to see the stand of the central stations in encouraging the dealers to sell appliances. He also stated that in the past year 19 dealers had moved into new quarters, 16 had completely remodeled their stores and many other stores had been rearranged. He was very enthusiastic over the outlook and stated that with the help of the Salesman's Auxiliary he felt confident the Campaign would take big strides.

Mr. Pence explained how the territory of Southern California had been divided into sections, and a vice-chairman of the Salesman's Auxiliary put in charge of each district, with two salesmen under him to help in promoting the work of the Campaign. All other salesmen were expected to help, but definite work to be carried out would be assigned to members of the committee.

The committeemen will be changed from time to time, so that the work will be equally distributed.

BUILDERS OF THE WEST—LVI.



STANLY A. EASTON

The inspiration of the West with its boundless possibilities and the vastness of the scale of its operations has called for the initiative in Western engineers to step beyond the bounds of tradition and establish new records in every line of endeavor. Among the world records thus established in the West is that of the electrification of the Bunker Hill and Sullivan mine at Kellogg, Idaho—the greatest lead silver mine in the world and the one operated most completely by electricity. To Stanly A. Easton, the efficient general manager of the mine, to whom is due an enduring share of the credit for this feat, this issue of the Journal of Electricity is affectionately dedicated.

Electrical Contractors and Dealers, Salt Lake City

As one of the results of the recent electrical gathering in Salt Lake City the electrical men of the city have organized the "Electrical Contractors and Dealers' Association of Salt Lake City." The officers are as follows: President, G. W. Forsberg; vice-president, J. V. Buckle; secretary, E. H. Eardley; treasurer, L. G. Robbins.

Oregon Association of Electrical Contractors and Dealers

The regular meeting of the Oregon Association of Electrical Contractors and Dealers for District No. 1 was held on June 2. The Wiring Committee reported on its plans for the house-wiring campaign, and the question of establishing an approximate standard price for installing electric ranges was referred to the Wiring Committee.

J. R. Tomlinson was elected a member of the local Executive Committee to fill the vacancy left by the resignation of R. W. Larsen.

Vancouver Association of Electrical Contractors and Dealers

One of the results of the recent Contractor-Dealer Convention at Vancouver (an account of which appeared in our last issue) is to be the organizing of all the electrical men in British Columbia into an Electrical Club which, it is hoped, will run in association with a projected Electrical Engineers' Association and with the Vancouver Association of Electrical Contractors and Dealers.

A. I. E. E. Annual Convention

The Thirty-fifth Annual Convention of the American Institute of Electrical Engineers was held June 24-27 at the Lake Placid Club, Essex county, New York. Following the annual Presidential Address, by President C. A. Adams, came the introduction of President-elect Calvert Townley, the remainder of the session being devoted to the presentation of papers under the auspices of the Protective Devices Committee.

On the second morning the annual reports of the technical committees were presented and discussed; on the third there was an open conference under the auspices of the Committee on Development, and the last morning was given over to a Technical Session, under the auspices of the Transmission and Distribution Committee, at which a number of interesting papers were presented.

National Electrical Credit Association

The twentieth annual meeting of the National Electrical Credit Association was held at Hotel Gibson, Cincinnati, June 13th and 14th. The meeting convened at ten o'clock. President Charles C. Hillis, Electric Appliance Company, San Francisco, welcomed the delegates who came mostly from the eastern, southern and central states. He was followed by a brief report from each of the members on the National Board of Managers representing the Electrical Credit Associations of Boston, New York, Philadelphia, Chicago and San Francisco, the activities of which cover the entire country.

The General Secretary's summary showed a total membership of 577 of the representative electrical manufacturers and jobbers.

The total number of names of slow or otherwise unsatisfactory customers reported to the five associations was 167,758. Both in number and in amount involved there was a decrease on an average of 30% as compared with the preceding year, and of more than 50% as compared with the totals of 1915. It was conceded that the activities of the five local associations of Boston, New York, Chicago, Philadelphia and San Francisco, composing the national body, had served in such timely fashion for the members generally as to guide them against extending credit to irresponsible or unsatisfactory customers and thus save them from preventable losses. The showing, therefore, was regarded as a splendid evidence

of the effectiveness of the service of the Electrical Credit Association.

In recognition of increased expenses the national board voted to increase the per capita dues levied by the National Association upon the five local associations, effective November 1, 1919, to insure a safe margin in the financial budget upon which to conduct the service.

It was provided further that the names of municipalities defaulting in the payment of their indebtedness, warrants, etc., to members, should appear in a special department of the National Monthly Bulletin for the credit guidance and protection of the membership at large.

The most important single report presented was that by George J. Murphy, Pettingell-Andrews Company, Boston, chairman of the Committee on Standard Accounting System for Contractors and Dealers in the electrical industry. The work of Mr. Murphy and his committee received the unanimous and hearty endorsement of all members present and it was urged that each should study the 12-page pamphlet issued by the National Association of Contractors and Dealers, 110 W. 40th St., New York City, embodying the work of the committee, and that the system be adopted by the contractor and dealer customers of the manufacturers and jobbers composing the National Electrical Credit Association.

Particularly notable was the address of W. C. Culkins, Director of Street Railways of Cincinnati, who took as his subject Public Utilities and showed the absolute necessity for a better understanding of the problems of public utilities by the citizens at large.

Among the subjects of general interest treated by the members attending was the address of T. K. Quinn, of the National Lamp Works at Cleveland, on Consignment Credits and Lamp Agents. The value of the National Monthly Bulletin and the systematic use of forms by William R. Conklin of the Waclark Wire Company of Elizabeth, N. Y. V. G. Fullman of the Steel City Electric Company, Pittsburgh, spoke informally on credit interchange luncheon clubs. The other subjects presented in the advance notice of the meeting were ably handled by the speakers assigned.

The following officers were elected: President, Benj. P. George, Beardslee Chand. Mfg. Co., Chicago; vice-president, Geo. J. Murphy, Pettingell-Andrews Co., Boston; general secretary-treasurer, Frederic P. Vose, Chicago; assistant secretary-treasurer, Walter S. Vose.

San Francisco Electrical Development League

At a meeting of the San Francisco Electrical Development League held on June 16th the Reverend Josiah Sibley, pastor of Calvary Presbyterian Church, gave a most forceful and interesting talk on Cooperation and its relation to the unified church movement. C. E. Wiggin, who was chairman of the day, spoke on the position of the jobber in the electrical industry.

A. I. E. E., Portland Section

The new officers of the local section of the A. I. E. E., Portland, Ore., are as follows: W. D. Scott, chairman; E. H. Le Tourneau, secretary; R. M. Boykin, W. C. Heston and E. W. Moreland, executive committee.

N. E. L. A., Portland Section

At a recent meeting of the local section of the N. E. L. A., Portland, Ore., the following officers were elected: F. H. Murphy, chairman; C. L. Wernicke, vice-chairman; Geo. Bowen, secretary; R. J. Davidson, treasurer; E. D. Searing, E. F. Whitney, and W. M. Wood, executive committee.

Pacific Service Employees Association Dinner

The third annual dinner of the Pacific Service Employees' Association of the Pacific Gas & Electric Company was held in San Francisco on June 19th, with a large and enthusiastic attendance. F. R. George, chairman of the Asso-

ciation, presided as toastmaster. John A. Britton urged upon his auditors the necessity for loyalty and the steadfast adherence to the principles under which the American government was founded, and for cooperation in the continued support of right principles.

Mr. Britton introduced Hon. Henry A. Melvin, Associate Justice of the California Supreme Court, who gave an address on "The Layman's False Notion of Cross Examination."

In connection with the entertainment features an elaborate program was staged under the direction of R. E. Fisher, as chairman of the Program Committee.

Illuminating Engineering Society

The 1919 Convention of the Illuminating Engineering Society will be held at the Hotel Sherman, Chicago, Ill., on October 20th to 23rd, inclusive.

The chairman of the 1919 Convention Committee is Homer E. Niesz; vice-chairman, Wm. A. Durgin, and secretary, Edwin D. Tillson.

Colorado Electric Light, Power and Railway Association

The following officers have been elected by the Electric Light, Power and Railway Association of Colorado: President, E. A. Phinney, Jefferson Power and Light Company, Golden, Colo.; vice-president, Norman Read, Colorado Power Company, Denver; secretary and treasurer, F. P. Safford, Denver Gas & Light Company, Denver. Meetings will be held on special occasions and the Association will hold its annual convention at Glenwood Springs in September.

Santa Cruz Convention of Electrical Contractors and Dealers

The electrical men convening at Santa Cruz on June 27 and 28 enjoyed a large number of social events in addition to the very interesting program outlined in our last issue. Golfing, swimming, boating and dancing were available to the guests, and those able to stay over at the close of the convention had an opportunity to witness the swimming meet scheduled for June 28 and 29.

A. I. E. E. Western Members

The following were among those elected to Associate membership in the American Institute of Electrical Engineers at the meeting held on May 16, 1919:

Harold Butler Barnes, Electrical Engineer, of H. B. Barnes and F. S. Youtsey, Denver, Colo.; John Emil Beckman, Chief Operator, Bryant St. Substation, U. R. R. of San Francisco, San Francisco, Cal.; Wallace Brier, Batterymen, Puget Sound Traction, Light & Power Co., Seattle, Wash.; Orange Reece Cole, Division Supt. of Construction, Pacific Telephone & Telegraph Company, San Francisco, Cal.; Charles Mortimer Day, Chief Draftsman, Electric Division, U. S. Reclamation Service, Denver, Colo.; Edward F. Dunlap, Salesman, Economy Fuse & Manufacturing Company of Chicago, Portland, Ore.; Ernest Hattrick, Asst. Elec. Engr., Mountain States Telephone & Telegraph Company, Denver, Colo.; John Edward Heller, Engineer on Transmission Work, Pacific Telephone & Telegraph Company, San Francisco, Cal.; Joseph C. Henkle, Supt. Service Dept., Portland Railway, Light & Power Company, Portland, Ore.; Noel Bertram Hinson, Distribution Dept., Southern California Edison Company, Los Angeles, Cal.; Roy Lester Houck, Testing Dept., Portland Railway, Light & Power Company, Portland, Ore.; Homer G. Keesling, Asst. to Supt. of Elec. Distribution, Pacific Gas & Electric Company, Oakland, Cal.; Robert William Koch, Manager Electrical Dept., The Flint Electric & Manufacturing Company, Denver, Colo.; Franck Laine, Sales Engineer, Westinghouse Electric & Manufacturing Company, San Francisco, Santa Clara, Cal.; Donald R. McClung, Designing Draftsman, Pacific Power & Light Company, Portland, Ore.; Frank Nosworthy, Switchboard Engineer, Pacific Telephone & Telegraph Company, San Francisco, Cal.; Wilber H. Robinson, Electrician, Sunset Motor Company, Spokane, Wash.; Benedict Shubart, Manufacturers' Agent, Denver, Colo.; Conrad J. Steinel, Supt. of Telegraph, L. A. & S. L. R. R., Los Angeles, Cal.

WESTERN MEETINGS

June 11—Jovian Electric League, Los Angeles—Prof. Kio Sue Inui—"Japan's Policies in the East and How They Affect American Interests."

June 19—A. S. M. E., Los Angeles Section—Lieut. Harold E. Weeks—"The Balloon and Aerial Photography in Its Relation to Warfare."

June 23—San Francisco Electrical Development League—D. C. D. Miel.

June 27—Engineers' Club of San Francisco—Major F. T. Robson—"Over There."

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers

President—Calvert Townley, Westinghouse Electric & Manufacturing Company.
Secretary—F. L. Hutchinson, Engineering Society Bldg., New York City.
Meetings—Monthly.

Los Angeles Section

Chairman—J. H. Cunningham, General Electric Co., Los Angeles.
Secretary—Clem A. Copeland, Bureau of Power and Light, Los Angeles.
Meetings—Second Tuesday of each month.

Portland Section

Chairman—W. D. Scott, Pacific Telephone & Telegraph Company, Portland, Ore.
Secretary—E. H. Le Tourneau, Portland Railway, Light & Power Company, Portland, Ore.
Meetings—Monthly.

Denver Section

Chairman—Fred J. Rankin, Colorado Pub. Utilities Com., Denver.
Secretary—Robt. E. Bonney, 603 Wyoming Bldg., Denver, Colo.
Meetings—Third Saturday of each month, from October to May, at the Denver Athletic Club. Dinner at 6:15 p.m., followed by regular meeting.

San Francisco Section

Chairman—J. C. Clark, Stanford University, Cal.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings—Fourth Friday each month—Engineers' Club, 7 p.m.

Seattle Section

Chairman—John Harisberger, 4015—4th Ave. N. E., Seattle, Wash.
Secretary—T. C. Smith, City Lighting Department, Seattle, Wash.
Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.

Spokane Section

Chairman—George Nixon, Main and Lincoln Sts., Spokane.
Secretary—G. H. Hoppin, 1128 W. Kiernan Ave., Spokane.
Meetings—Third Friday of each month.

Utah Section

Chairman—A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
Secretary—H. T. Plumb, 183 U St., Salt Lake City, Utah.
Meetings—Third Wednesday of alternate months, 8 o'clock. Assembly Room of Commercial Club, Salt Lake City.

Vancouver Section

Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch

Chairman—A. E. McMahon, University of California, Berkeley, Cal.
Secretary—D. D. Davis, University of California, Berkeley, Cal.

University of Colorado Branch

Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

Idaho University Branch

Meetings—First Wednesday evening of each month from October to June.

Oregon Agricultural College Branch

Chairman—Lawrence Fudge, Oregon Agr. College, Corvallis, Ore.
Secretary—Otto L. Cantrall, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch

Montana State College Branch

Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.

Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Throop College of Technology Branch

Chairman—Mark Sawyer, Throop Dormitory, Pasadena, Cal.

Secretary—Russell Otis, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch

Chairman—Clarence E. Guse, Pullman.

Secretary—Ralph C. Guse, State College of Washington, Pullman.

Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS**National Association of Electrical Contractors and Dealers**

Chairman—W. Creighton Peet.

Secretary—W. H. Morton, 110 West 40th St., New York.

Executive Committeemen, Pacific Division—J. R. Tomlinson, Portland, J. F. NePage, Seattle, Wash.

Electrical Contractors & Dealers of Salt Lake City

President—C. W. Forsberg.

Secretary—E. H. Eardley, Eardley Bros., Salt Lake City.

British Columbia Ass'n Electrical Contractors and Dealers

President—E. Brettell, Vancouver, B. C.

Secretary—Capt. W. J. Conway, Vancouver, B. C.

Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers

President—M. A. DeLew, 180 Jessie St., San Francisco.

Secretary—J. W. Redpath, Rialto Bldg., San Francisco.

Meetings—Monthly.

Electrical Contractors and Dealers Ass'n of San Francisco

President—C. L. Chamblin, 641 Mission St., San Francisco.

Secretary—J. Stewart, San Francisco.

Meetings—Saturday 12:30; The States.

Southern California Electrical Contractors and Dealers

President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.

Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.

Meetings—Every Friday at 6:30 p.m. at the Pin Ton Cafe, 427 South Broadway.

Monterey Bay Electrical Contractors and Dealers

President—W. Cox, Santa Cruz.

Secretary—D. K. Noggle, Monterey.

Nevada Ass'n of Electrical Contractors and Dealers

President—F. V. McAvoy, 138 N. Canter St., Reno.

Secretary—R. W. Shearer, 215 Sierra St., Reno.

Meetings—Twice a month, 15th and 30th.

Oregon State Ass'n of Electrical Contractors and Dealers

President—R. C. Kenney, 388 Burnside street, Portland.

Secretary—J. Willis Oberender, 209-10 McKay Bldg., Portland, Ore.

Portland Local Ass'n of Electrical Contractors and Dealers

President—Roy C. Kenney, Portland.

Secretary—J. W. Oberender, 209-10 McKay Bldg., Portland.

Meetings—Alternate Mondays at Imperial Hotel Grill.

Sacramento Section, California Electrical Contractors & Dealers' Association

President—W. H. Gribble, Sacramento.

Secretary—H. Berg, Sacramento.

Washington Ass'n of Electrical Contractors and Dealers

President—V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.

Secretary—Forrest E. Smith, Seattle, Wash.

Meetings—Quarterly—second Thursdays of March, June, September and December.

JOBBER'S ASSOCIATIONS**Electrical Supply Jobbers Association**

General Secretary—Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.

Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers

President—W. S. Berry, Western Electric Company, San Francisco.

Secretary—Albert H. Elliot, 544 Market St., San Francisco.

Meetings—Quarterly.

Electrical Credit Ass'n of the Pacific Coast

President—C. L. Gilson, Gilson Electrical Supply Co., 304—12th St., Oakland, Cal.

Secretary—Albert H. Elliot, 544 Market St., San Francisco.

Meetings—annually; San Francisco; May.

OF ELECTRICAL INTEREST**California Electrical Cooperative Campaign**

Chairman Advisory Committee—L. H. Newbert, 445 Sutter St., San Francisco.

Secretary—R. M. Alvord, Rialto Bldg., San Francisco.

National Electric Light Association

President—R. H. Ballard, Southern California Edison Company.

Secretary—A. H. Halloran, Journal of Electricity.

Nevada Section, N. E. L. A.

Chairman—Geo. A. Campbell, Reno, Nev.

Pacific Coast Section, N. E. L. A.

President—A. E. Wishon, San Joaquin Light & Power Corporation, Fresno, Cal.

Secretary—A. H. Halloran, Journal of Electricity, Electric Bldg., San Francisco.

Meetings—Annually, in April.

Portland Section, N. E. L. A.

Chairman—F. H. Murphy, Portland Railway, Light & Power Company.

Secretary—Geo. Bowen, Portland, Ore.

Illuminating Engineering Society

President—George A. Hoadley.

Secretary—Clarence L. Law.

Western Representatives—Romaine Myers, Bacon Bldg., Oakland, Cal.; C. M. Masson, Edison Bldg., Los Angeles; F. H. Murphy, Portland Railway Light & Power Company, Portland, Ore.; W. R. Putnam, Utah Power & Light Company, Salt Lake City; Fred A. Osborn, University of Washington, Seattle, Wash.

Meetings—First Tuesday each month.

New Mexico Electrical Association

President—D. W. Morgan, Las Cruces, N. M.

Secretary—Charles Twogood, Albuquerque, N.M.

Meetings—Annually, in February.

Southwestern Electrical and Gas Association

President—W. A. Sullivan, Shreveport, La.

Secretary—H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Northwest Electric Light and Power Ass'n

President—H. J. Gille, Puget Sound Traction Light & Power Co.

Secretary—W. E. Herring, Puget Sound Traction, Light & Power Co.

Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.

Los Angeles Jovian Electrical League

President—A. E. Peat, San Joaquin Light & Power Corp.

Secretary—Frank Weiss, Los Angeles Gas & Electric Corp.

Meetings—Every Wednesday, 12 m.

San Francisco Electrical Development League

President—Garnett Young, 612 Howard St., San Francisco.

Secretary—J. W. Redpath, Rialto Bldg., San Francisco.

Meetings—Every Monday, 12:10 p.m.; luncheon, Palace Hotel.

Electric Metermen's Association

President—J. E. Bridges, Westinghouse Electric & Manufacturing Company.

Secretary—A. E. Coney, Great Western Power Company, San Francisco.

Meetings—About every 60 days.

Alameda County Electrical Club

President—George Drew, Pacific States Electric Company, Oakland, Cal.

Secretary—George B. Furniss, Pacific Gas & Electric Company, Oakland, Cal.

Synchronous Club

Secretary—H. N. Beecher, City Hall, Los Angeles.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section

President—W. H. Brommage, Pacific Tel. & Tel. Co., San Francisco.

Secretary—Chas. H. Dobson, 835 Howard St., San Francisco.

MECHANICAL ENGINEERS**National Officers**

President—Mortimer E. Cooley, Electrical Engineering Dept., Ann Arbor, Mich.

Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

San Francisco Section, A. S. M. E.

President—E. C. Jones, Pacific Gas & Electric Co., San Francisco.

Secretary—Geo. L. Hurst, Bethlehem Ship Bldg. Corp., Ltd., San Francisco.

Meetings—Quarterly.

Thursday lunches have been arranged at the Engineers' Club, 57 Post St.

Los Angeles Section, A. S. M. E.

President—Charles H. McGuire.

Secretary—T. J. Royer.

Meetings—Quarterly.

ENGINEERS' CLUBS**Oregon Society of Engineers**

President—John W. Cunningham, 414 Spalding Bldg., Portland.

Secretary—Orrin E. Stanley, Box 973, Portland.

Meetings—Annual: First Monday in February.

Monthly: Third Thursday of each month.

Third Thursday of each month.

The Engineers' Club of Seattle

President—H. E. Horrocks, Seattle, Wash.

Secretary—E. J. Bartells, Northern Life Bldg., Seattle, Wash.

Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco

President—A. E. Chandler, New Call Bldg., San Francisco.

Secretary—J. R. Brownell, 525 Market St., San Francisco.

Annual Meeting: October.

Idaho Society of Engineers

President—W. H. Gibson, Mountain Home, Idaho.

Secretary—Ira F. Shaffner, Boise, Idaho.

Engineers' Club of Oakland

President—R. S. Chew, Oakland Chamber of Commerce, Oakland.

Engineers' Club of Sacramento

President—George S. Nickerson, 914 Forum Bldg., Sacramento.

Secretary—P. M. Noeboe, State Department of Engineering, Forum Bldg., Sacramento.

United Engineering Societies of San Francisco

Chairman—C. D. Marx, Stanford University.

Secretary—Nathan Bowers, Rialto Bldg., San Francisco.

Joint Committee Technical Societies of Los Angeles

Chairman—George A. Damon.

Secretary—W. K. Barnard, 705-6 Central Bldg., Los Angeles.

Utah Society of Engineers

President—Leonard Cahoon.

Secretary—Wm. H. Kelsey.

Meetings—3rd Wednesdays except May, June, July and August.

Annual banquet—May.

MISCELLANEOUS**American Ass'n for the Advancement of Science—Pacific Division**

President—D. T. MacDougal, Director Desert Laboratory, Carnegie Institution, Tucson, Arizona.

Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.

Meetings—Annual.

Portland Section A. S. C. E.

President—P. H. Dater, Eng. U. S. Forestry Service.

Secretary—C. P. Keyser, Park Bureau, Portland, Oregon.

Meetings—At call of president.

Spokane Engineering & Technical Ass'n

President—L. K. Armstrong, A. S. M. E.

Secretary—A. D. Butler, City Engineer, Spokane, Wash.

Meetings—Third Friday of each month. Joint with A. S. C. E., A. I. E. E. and A. S. M. E.

Foreign Trade Club

President—W. H. Hammer, Monadnock Bldg.

Secretary—Wm. E. Hague, Monadnock Bldg.

Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.

Pacific Coast Gas Association

President—John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.

Secretary—Henry Bostwick, 445 Sutter St., San Francisco.

Society for Promotion of Engineering Education

Secretary—F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

Los Angeles Transportation Association

President—C. G. Krueger, 324 S. Broadway, Los Angeles.

Secretary—D. W. Ferguson, 324 S. Broadway, Los Angeles.

HAPPENINGS IN THE INDUSTRY

LOS ANGELES PURCHASES DISTRIBUTING SYSTEM OF THE SOUTHERN CALIFORNIA EDISON COMPANY

A heavy vote was registered at Los Angeles, California, on the proposed issue of \$13,500,000 bonds by the city for the purchase of the electric distributing system of the Southern California Edison Company. The proposal was carried by 1300 votes more than the necessary two-thirds majority. The question of authorizing the sale of surplus aqueduct power to the Edison Company was also carried, receiving 300 votes over the necessary two-thirds of the total vote cast.

The purchase price is divided between \$1,000,000 including the physical valuation and \$2,453,067 severance damages for taking the business of the company. For thirty years the city is to purchase from the company power required in addition to that generated in its own plants, the price to be fixed by the State Railroad Commission.

The Edison Company retains all of its business outside the city and also the traction load within the city.

THE HETCH-HETCHY CASE

In testifying for San Francisco in the city's suit to condemn the lands of the Yosemite Power Company in the Poopenaut Valley, City Engineer O'Shaughnessy stated that the three dams of the original project, Hetch-Hetchy, Lake Eleanor and Cherry Creek, will be insufficient, and that five more dams will be necessary to meet the city's future need of water. The Poopenaut Valley is desired for one of these.

From the testimony of Engineer J. D. Galloway it appeared that the city also needed the Poopenaut Valley dam site for a regulating reservoir to serve the contemplated power projects associated with the water-supply development, and the question of adequately financing the scheme by means of further bond authorization is demanding the city's serious attention.

NATIONAL ELECTRICAL CODE CORRECTION

In the printing of the 1918 edition of the National Electrical Code the second paragraph of Rule 23, section A-2 was accidentally omitted. In the 1915 edition of the Code the paragraph read as follows:

"Where the switch required by No. 24 'a' is inside the building, the cutout required by this section must be placed so as to protect it, unless the switch is of the knife blade type and is enclosed in an approved box or cabinet, under which conditions the switch may be placed between the source of the supply and the cutout."

The Electrical Committee of the National Fire Protection Association has voted that this matter be given the publicity necessary to inform interested parties of the omission.

ELECTRIFICATION OF RAILWAYS IN JAPAN

The Imperial Government Railways have decided to electrify part of the steam road. The sections already decided upon are as follows: Yokohama to Numazu, 67.4 miles; Ofuna to Yokosuka, 10 miles; Ueno to Ohmiya, 16.6 miles; Ryogoku to Chiba, 22.7 miles, making a total of 116.7 miles. The only difficulty confronting the authorities is the lack of suitable sources of electricity. It is said that engineers will be sent to nine provinces surrounding Tokyo in quest of promising water power sites.

When the project under consideration is realized, practically all the roads entering Tokyo will be electrified, and will be of considerable service in increasing the transit capacity as well as in clearing the city of the smoke and dust attendant on steam locomotives.

THE ELECTRICAL INDUSTRY IN CHINA

During 1916 and 1917 the value of electrical materials imported into China increased from \$39,273 to \$66,563. As articles imported for government use are duty free and not listed, these figures do not include the customs returns on materials purchased for the government-operated electric light and telephone departments. In 1916 the electricity department of Tsingtau expended \$44,699 for materials, and \$55,700 in 1917.

NEW PLANT IN WYOMING

At Green River, Wyoming, the new plant of the Liberty Potash Company of Salt Lake City is nearing completion. The electrical equipment consists of 2—500 kw. Allis-Chalmers generators driven by Parsons steam turbines, which supply the power for electric drive throughout the plant. The steam boiler equipment consists of 4—250 h.p. Babcock & Wilcox Stirling boilers, provided with chain-grate automatic stokers. From the ash-pits a tramway will carry the ashes to the elevator which is to dump them into waiting cars.

RAILROAD COMMISSION HEARING

Departing from its customary course, the Railroad Commission held a "Safety Valve" hearing recently at the close of the more formal presentation of points for and against discontinuing the war surcharge in the electricity rate. Grievances of individuals and corporations were presented and aired.

The Natomas Consolidated, represented by Charles W. Slack, protested that the war surcharge cost of electric power is a hard burden for the gold dredgers, since the value of the gold has grown less in purchasing power, while all the costs of operation have increased. He said that the production of gold is encouraged by the Federal Government and should not be discouraged by state-made rates for electric power. The other companies engaged in dredging for gold had the same complaint, and some of them said the voltage had gone down while the rates had gone up.

UNITED STATES CIVIL SERVICE EXAMINATIONS

The United States Civil Service Commission announces open competitive examinations for the positions of Radio Inspector and Radio Subinspector, for both men and women.

The duties of the first position will be to supervise the installation of radio apparatus on ship and ashore under the supervision of the radio officer; to calibrate and adjust radio transmitters and receivers; to make service measurements, such as capacities of antennae, damping of spark transmitters, etc.; and to make routine inspections of radio apparatus installed on ship or shore stations. Appointees must be qualified to handle men doing installation work under their guidance.

The duties of appointees to the position of Subinspector will be to assist in installing radio apparatus on ship or shore stations, make simple calibrations and adjustments of radio apparatus, and make routine inspections of radio apparatus when installed.

Other examinations announced are for the positions of Radio Laboratorian and Laboratorian Aid, Expert Radio Aid, and Electrical Assistant. These are listed for men only.

JAPANESE NOTES

It is reported that Tokyo is to have a subway to help solve its transportation problem, but in order to render im-

mediate relief to the traffic conditions, the mayor of Tokyo has recommended to the city council the purchase of 200 street cars.

To meet the increased demand for electric light bulbs, a Japanese bulb manufacturing concern is arranging for the installation of a large number of additional machines during the present year.

ALAMEDA CLOSES ITS POWER PLANT

The municipal electric lighting plant at Alameda, Cal., which for some months has been supplying but a small portion of the power used in the city, is today idle, following a decision recently made to use entirely current purchased from power companies.

The high cost of fuel at present and the fact that an existing contract with a power concern provides the city with current at a figure permitting resale at a profit, has brought about the determination to close the plant at least for the present.

SALE OF NORTHERN CALIFORNIA POWER COMPANY

Directors of the Northern California Power Company met recently at the office of the company and unanimously approved the action of President W. F. Detert in making a tentative agreement for the sale of the properties of the company to the Pacific Gas & Electric Company at \$34 a share. Notices have been sent out to the stockholders fixing a date for final deposit of stock with the Mercantile Trust Company and carrying full details of the reasons why it is advisable to sell the properties. These details have already been published. It is understood that a sufficient number of stockholders have assented to the sale and agreed to make the deposit of their stock when notified to do so.

WATER POWER DEVELOPMENT IN NEW SOUTH WALES

In the State of New South Wales there is under consideration a scheme of hydroelectric development of the Nymboida River. It is estimated that the cost would be about \$175,000, and would comprise in part alterations to tunnel inlet works on the river, the installation of two 800-kilowatt generators, a transmission line of 23 miles, and a distribution system in the towns of Grafton and South Grafton. It is the purpose to furnish power to farmers along the way for small engines as well as to the towns of Grafton and South Grafton.

TRADE NOTES

New Business —

The Electric Furnace Construction Company, Finance Building, Philadelphia, reports the following orders received for Greaves-Etchells Electric Furnaces: Lancia Company, Turin; Bresciana Company, Brusche.

They have also successfully started up new furnaces at the Daimler Motor Company, Coventry; at the Tyne Electric Steel Foundries, Ltd.; and also a furnace for Kayser-Ellison & Company, Ltd., Sheffield, designed for up to 15 tons cold metal or 20 tons hot metal process.

New Offices

The Central Steel Company, Massillon, Ohio, has opened up new offices in Detroit, in the Book Building, 35-37 Washington Boulevard. Mr. Arthur Schaeffer, former assistant director of sales at the home office, Massillon, has been appointed district manager of sales, with Frank Gibbons as his assistant.

Business Plans —

The Northern Auto Electric Company, a co-partnership recently formed by Fred C. Guenthere and Wm. G. Grabau, both of Oakland, California, has been awarded the King and Pierce counties, Washington, agency for the Exide storage batteries and have completed negotiations for a long time

lease on the southeast corner of Summit avenue and East Pike street, Seattle, and a 90 by 60 ft. one-story frame building is to be erected for their use. A specially built generator set has been purchased by the company and is to be installed as soon as delivered. Other modern equipment will also be installed.

Partnership Resumed —

E. C. Miller, for the past two years engineer for the Kilbourne & Clark Manufacturing Company, Seattle, makers of wireless apparatus, has resumed his partnership with his father G. M. Miller, in the hydraulic and general engineering field. The firm name will be G. M. Miller & Son with offices in the Burke Building, Seattle. The concern has just completed a valuation of the Edmonds, Washington, water system, controlled by the Yost estate of Edmonds, which is offering to sell it to the city.

Bond Issue —

Henry L. Doherty & Company, Syndicate Managers, announce they are forming a syndicate to underwrite an issue of \$25,000,000 Bond Secured Sinking Fund Convertible 6% Notes of the Empire Gas & Fuel Company, the principal oil producing subsidiary of the Cities Service Company.

Distributors Appointed —

The National Tube Company of Pittsburgh, Pa., have made arrangements with the National Metal Molding Company, of Pittsburgh, and the American Circular Loom Company, of New York, to act as their distributors of Spellerized Mild Steel Tubing, made especially for the manufacture of rigid steel conduits. These two companies will, as heretofore, finish and market this tubing under the following trade names: National Metal Molding Company, "Sherarduct" and "Economy"; American Circular Loom Company, "Xduct" and "Electroduct."

Expansion of Service —

The Central California Electric Company, Inc., of Lindsay, Cal., has added four automobile electric service stations in connection with their regular contracting business. These are located at Lindsay, Exeter, Visalia and Tulare.

Western Distributors —

Simplex Electric Heating Company of Cambridge, Mass., have made arrangements with M. Seller & Company of Portland, Ore., with branches at Tacoma, Seattle and Spokane, to act as distributors for the states of Oregon and Washington of their new spherical type glowing radiator and also their ranges, flat irons and heating pads.

Patent Suit —

The Majestic Electric Development Company has issued the following statement:

"On June 16, 1919, a jury in the District Court of the United States for the Northern District of California, in San Francisco, rendered verdicts in our favor in two cases sustaining the validity of our design patent, No. 51,043, issued July 17, 1917. One of these suits was against Holabird Electric Company and the other one was against Hale Brothers, Inc., R. H. Henderson and Hotpoint Electric Heating Company, and they involved the two forms of the so-called "Hedlite Heater" heretofore put out by the Hotpoint Company, both of said forms being held by the jury to be infringements upon our said design patent."

Business Announcement —

The Garden Electric Manufacturing Company of Emeryville, Cal., announces that it is specializing on the manufacture of transformers, and will shortly issue a leaflet describing a variety of its products, ranging from small air cooled low voltage transformers to large high tension transformers.

New Headquarters —

The Anaconda Copper Mining Company has moved its main selling headquarters for the Rolling Mills Department from Great Falls, Montana, to 1102 Westminister Building, Chicago, Ill. The object of the move is to have the office more centrally located.

INFLUENCE OF FORESTS ON WATER SUPPLY

A Letter to the Editor

(The article to which this writer takes exception appeared in the March 15th issue of the Journal of Electricity. We are always glad to print letters from our readers and we welcome all discussion of material appearing in our columns.—The Editor)

Editor, Journal of Electricity:

The writer wishes to enter a protest against the acceptance of the conclusions reached in the article by Alfred A. Griffin under the above title, appearing in the issue of March 15, 1919, of the Journal of Electricity.

The conclusions quoted from that article are:—

"The retardation of this amount of snow is sufficient to be of great importance to irrigation interests, especially as it is generally understood that a forest cover tends to 'flatten out' the crest of a flood, and thus to increase the minimum flow at periods of low water. A forest cover thus supplements the possible artificial reservoirs."

The writer has been a close student of the irrigation and power developments in the Pacific Northwest for the past 14 years. During five years of that time he was in charge of the water supply investigation for that district for the U. S. Government. He believes he knows whereof he speaks.

The Tumalo and Yakima rivers drain the eastern slopes of the Cascades. There is much more irrigable land contiguous to both streams than the available water supply will irrigate. The waters of both streams are stored in reservoirs for irrigation purposes.

It is of vital importance, therefore, that there be as much run-off as possible from these areas, while the question of a few days delay in the melting of a small portion of the snowfall is so far down the scale of importance that it is of no concern whatever to the irrigator.

Now, what are the facts as evidenced by Mr. Griffin's figures?

1. The Yakima watershed would have had 15 inches more of snow in April, 1917, without forests than it did with them. This is equivalent to 225 acre-feet per square mile of drainage area.

2. The delayed melting caused by the forest cover was the equivalent of 360 acre-feet per square mile delayed for eleven days from June 11 to 22, long before the irrigation demand reached its climax in July and August.

3. The Tumalo watershed would have had 10 inches more of snow on April 5, 1915, without the forests. This is equivalent to 210 acre-feet per square mile.

4. The delayed melting in 1916 was the equivalent of 465 acre-feet per square mile for 15 days. Dates are not given, but doubtless prior to July 1 and certainly prior to the time of maximum irrigation demand.

5. On the Tumalo watershed in 1917 the delayed melting was the equivalent of 277 acre-feet for a period of not exceeding 4 days and long prior to the maximum irrigation demand. The total loss in water supply is not given.

6. The waters of Wind River are not, nor are they ever likely to be, used for irrigation. In 1916 the delayed melting was the equivalent of 720 acre-feet per square mile for 17 days. In 1917 it was equivalent to 160 acre-feet for 8 or 9 days. The total losses are not given.

The reason for the loss of water in forested areas is obvious. The trees themselves catch a large portion of every snowfall and hold it until evaporated. This portion never reaches the ground and of course is not available as stream-flow.

In the open all the snowfall reaches the ground, which accounts for the greater depths at the open stations as noted by Mr. Griffin.

These areas were selected and the stations established thereon with a view to determining "with some definiteness the effect, if any, of forests in representative portions of the Cascade Range on the melting of winter snow cover * *." It is to be assumed therefore that the stations were at a sufficient elevation to fairly represent the average time of melting as influenced by altitude. An additional fact of importance is that the year 1916 was one of abundant water-supply during which there was no shortage of irrigation water. On the other hand, 1917 was a very low water year and acute

shortages of irrigation water were felt throughout all irrigated portions of the Northwest.

The actual effect of the forests on the Cascade Range, as evidenced by Mr. Griffin's presentation of the data, appears to have been:

1. To deprive the irrigator in a year of acute shortage of 200 or more acre-feet per square mile of drainage area that would otherwise have been reservoird and used for the production of crops.

2. To delay the melting of about an equal amount of snow for a week at the beginning of the irrigation season, and at a time when there is a large surplus of water in the streams; an effect utterly valueless to the irrigator.

The writer asks in all seriousness, do these effects tally with Mr. Griffin's conclusions that they are of "great importance to irrigation interests * * * and increase the minimum flow at periods of low water"?

The other statement, that "it is generally understood that a forest cover tends to 'flatten out' the crest of flood" is equally at variance with the facts.

The theory that forests on the watershed of a stream act as a substantial conserver of precipitation has been accepted by many people as an established fact. The theory has been so oft repeated and urged upon us so persistently that those who have given the subject only casual thought accept it without further question.

The fact is, however, that this theory has never been established, nor is it admitted by many scientists and engineers whose disinterested opinions on the subject we are forced to respect.

The writer has lately received an illustrated pamphlet entitled "What the National Forests Mean to the Water User," by Samuel Dana, Assistant Chief, Forest Investigations, published and distributed at government expense, in which the same sort of utterly unjustified conclusions are drawn from improperly digested data and examples.

There appears to be a determined effort to spread broadcast a propaganda that the forests have great economic and beneficial effects upon the water supply of the country. The reason for this is obviously to justify certain so-called conservation charges for water supplies originating within the national forests, and furthermore to enhance government control of national industries as affected by water power development.

The writer is a firm believer in and an ardent supporter of the principles of governmental control of national forests and other resources. He knows of no irrigation or power companies who object to paying their fair share of the cost of administration of the forest resources. He is passionately fond of the forested mountains with their cool shades and thundering rivers, and wonderingly adores the marvelous beauties in nature's gardens of the Northwest.

His sense of fairness, however, will not permit him to pass unprotested this spurious doctrine that, for purely sordid purposes, makes jest of our intelligence and gives the lie to nature.

J. C. STEVENS.

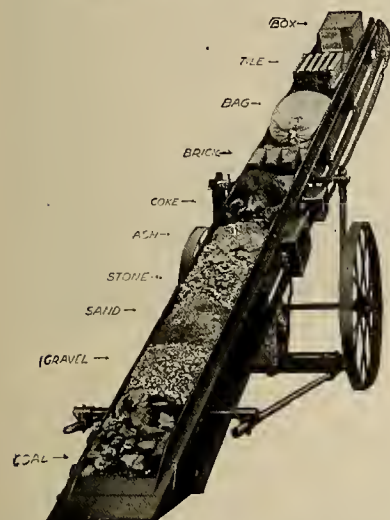
The Journal of Electricity is glad to give space to expression of views by its readers on subjects of interest appearing in its columns. These should be brief and impersonal in tone—but the presentation of either side of the controversy is welcomed. Address all communications, "Editor, Journal of Electricity, 171 Second Street, San Francisco."

LATEST IN EVERYTHING ELECTRICAL

(Portable equipment of light weight is always in demand, and the Scoop Conveyor and Electric Drill described and illustrated here aim to meet the need. An interesting meter-installation by a gas company, a handy lamp, a new type of rotor, and a well-constructed punch are among other recent developments in industrial devices.—The Editor.)

A NEW TYPE OF CONVEYOR

A new type of Portable Conveyor, which cuts the labor of loading one-half, is shown in the accompanying illustrations.



A 19 ft. 8 in. Scoop Conveyor equipped with 16 in. wide belt and driven by a 2 h.p. electric motor.

The most distinctive feature of this machine, called the Scoop Conveyor, is the scoop on the feeding end, which can be pushed or completely buried into the material to be conveyed. This makes it possible to simply scrape the material on to the carrying belt, instead of lifting it up by shovelfuls into the feeding hoppers of ordinary conveyors.

Another exclusive feature of this machine is the construction of the sides or skirt plates as they are called. These form a trough which enables a 12 in.

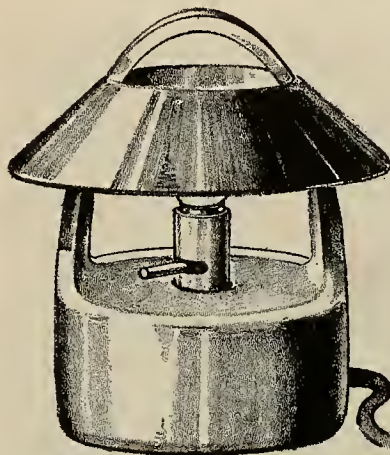
wide belt to equal in carrying capacity a 20 in. ordinary troughed belt, the side plates holding the material together and giving the whole width of the belt carrying effectiveness.

The carrying capacity of the conveyor, based on handling coal, is one ton per minute, provided a sufficient amount of coal is maintained at the receiving end of the machine. It is used principally for storing, reclaiming and loading bulk material and light articles, but serves a number of other purposes such as elevating material to tanks or platforms in chemical and industrial works, feeding from cars and delivering into fixed conveyors or stoker magazines at power plants, etc. Almost any kind of material can be handled, and the conveyor may be used singly, in tandem or in triplicate as may be required.

It is strongly constructed, light, compact and portable. It is manufactured by the Portable Machinery Company of Passaic, N. J., and obtainable in three different sizes.

A SMALL LAMP

An electrical novelty to be marketed under the trade



name Baby Light has been developed by the St. Louis Brass Manufacturing Company, St. Louis, Mo. It consists of an all-porcelain lamp, white glazed with a transformer device to reduce the voltage of an ordinary light circuit to six volts for a very small lamp. It is said that the current consumed with this device is so small that it will not turn the average house meter and

that the cost of operation in view of the small current consumption is so slight as to be insignificant.

The Baby Light will no doubt be favored for use in nurseries, sick rooms, halls, bed rooms and wherever a night lamp is desirable. It is complete with 6 feet of cord, plug, lamp, switch, etc., ready for use by screwing the plug to any lamp socket.

THOMAS METERS FOR GAS COMPANY

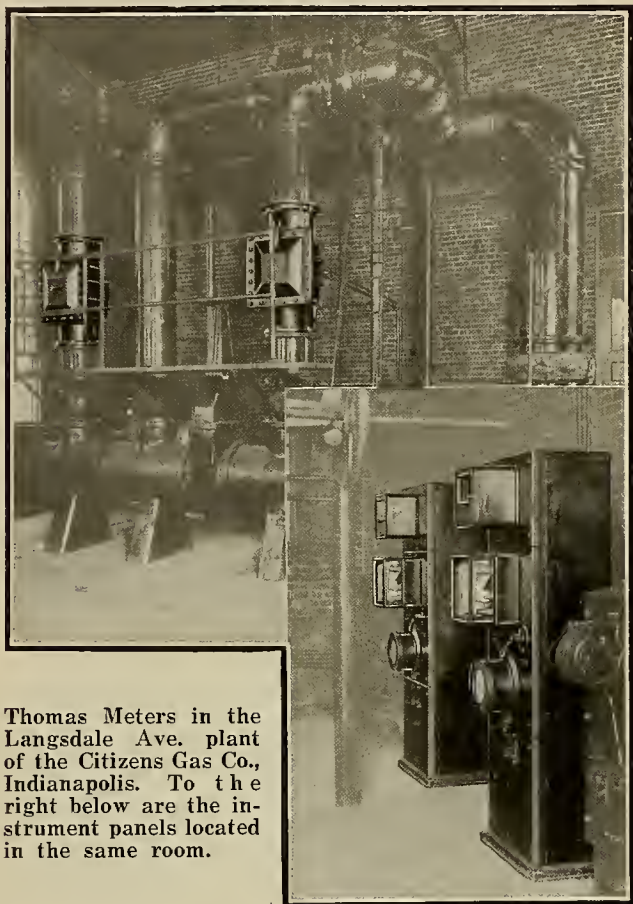
The Citizens Gas Company of Indianapolis has just completed the installation of two Thomas meters in their Langsdale Avenue plant. The equipment and piping arrangement is interesting because it permits the use of either of the two meters to measure the gas load while the other is held in reserve; or the two meters may be thrown in series, each measuring the same gas and checking the other's accuracy. When peak loads occur or when unusually heavy demands make larger capacity necessary, the two meters may be operated in parallel. The accompanying illustrations show the two meter housings and the instrument panels which contain the totalizing graphic meters. The meters measure the coke over gas obtained from one battery of 43 Semet Solvay ovens. The housings and panels are located in a part of the office building, which was formerly occupied by a 16 foot drum station meter. The housings are each 16 inches in diameter and are inserted in a 24-inch line between the purifiers and the storage holder. Each meter is of 200,000 cubic feet per



Unloading from a coal car to the storage pile with a Portable Scoop Conveyor. The conveyor may be used singly, in tandem or in triplicate according to the height and location of the car, pile or platform.

hour capacity, which is sufficient to handle the coke oven gas load. The pressure drop through the entire installation is less than $\frac{1}{2}$ inch of water with 200,000 cubic feet of gas per hour. A platform built around the housing facilitates inspection of the parts of the meters which are contained within the housings.

The providing of duplicate measuring and recording apparatus, although not generally practiced by gas plant management, is gaining favor with the appreciation of the value of accurate measurement of gas in large quantities. Especially is this true where the graphic records thus obtained have been an aid to more efficient operation.

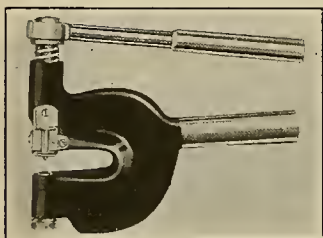


Thomas Meters in the Langsdale Ave. plant of the Citizens Gas Co., Indianapolis. To the right below are the instrument panels located in the same room.

A NEW TOOL

The accompanying illustration shows a new type of speed punch, put on the market by Paul W. Koch & Company. This tool, known as the "Jiffy" Punch, is $9\frac{1}{2}$ inches long, weighs five pounds, and punches $\frac{5}{32}$ in., $\frac{3}{16}$ in., $\frac{7}{32}$ in. and $\frac{1}{4}$ in. holes in metal up to 10 gauge.

Special features are the deep throat and one-piece automatic disappearing stripper, giving clear view to the punch



This tool can be clamped in a vise or carried to any place desired. It weighs five pounds.

and next punch mark. It permits of several sheets being punched with one operation. The handle above the center keeps the punch naturally upright. If desired the tool may be clamped in a vise.

A PORTABLE ELECTRIC DRILL

A portable electric drilling machine has recently been advantageously employed in countersinking ship plates at a number of fabricating shops engaged in work for the Emergency Fleet Corporation. A wall radial drill has usually been used for this purpose, but the portable electric drilling



This machine will countersink a hole up to one inch in diameter, and is readily moved on the buggy from one hole to another.

machine attached to a buggy designed for the purpose has resulted in greater speed and a reduction of labor cost.

The Van Dorn Electric Tool Company, of Cleveland, has recently designed a portable drilling machine, very powerful and of heavy, rigid construction. The machine is fastened into the buggy by two studs, these studs being screwed to trunnion bosses on the housing and fastened to the handles of the buggy. The buggy is counterweighted in front, leverage being provided by pressure applied to the handles. The plates being laid out on the shop floor, it requires only an instant to move the machine from one hole to another.

The machine is ball-bearing throughout. The top head and gear housing are bolted to the motor casing, eliminating tapped holes and worn-out threads. A double row of ball-bearings withstand both thrust and radial load.

The machine measures 22 inches and weighs 125 lbs. It is equipped with No. 4 Morse taper socket and will countersink a hole up to one inch in diameter. It is claimed that the buggy enables this machine to countersink a $\frac{3}{8}$ -inch hole in 7 seconds.

A NEW TYPE OF ROTOR

A new type of rotor with cast winding which has been recently designed by the General Electric Company, Schenectady, N. Y., presents new features and improvements worthy of brief description.

The bars and short-circuiting rings comprising the windings employ the same material and are cast in a single operation. With the windings thus made a solid unit, rigidity, durability, and better balance is procured. The cast winding from an electrical point of view also insures uniform cross section and union between the bars and the end rings. This has become a factor in eliminating operating difficulties due to open-circuiting of joints between bars and end rings.

Holes bored radially through the cast end rings give effective ventilation for rotation in either direction.

The new cast winding rotor is said to be especially effective on induction motors of the "Squirrel cage" type.

Books and Bulletins

Electricity and Magnetism for Engineers

Part II. Electrostatics and Alternating Currents

by Harold Pender, Ph.D., Professor -in-Charge, Electrical Engineering Department, University of Pennsylvania; Vice-President and Fellow, A. I. E. E. Size 6 by 9 in.; 221 pp.; published by the McGraw-Hill Book Company, Inc., New York, and for sale by the Technical Book Shop, San Francisco. Price \$2.00.

This volume completes the text of this work, the first part, "Electric and Magnetic Circuits," having appeared some months ago. The two volumes cover substantially the same ground as that of the author's "Principles of Electrical Engineering," published in 1911, but the treatment is different, the discussions are fuller, and practical applications are more freely introduced.

The second part includes chapters on Electric Fields of Force, Electrostatic Capacity, Sine-wave Alternating Currents, Polyphase Circuits, and Symbolic Notation. An index to both parts is appended.

A New Webster Dictionary

Under the title of Webster's Collegiate Dictionary, G. C. Merriam Co., Springfield, Mass., have published a singularly successful abridgment of Webster's New International Dictionary. Measuring 8 $\frac{3}{4}$ by 6 inches and containing 1248 pages, the book embraces a vocabulary especially designed to meet all the needs of the student, the writer and the business man. Special features are a pronouncing glossary of Scottish words, a list of abbreviations used in writing and printing, rules for punctuation and the use of capitals, and a pronouncing biographical dictionary. These and several other useful supplements make the volume one of immense practical value.

The Thin Paper Edition-de-Luxe is well bound with gilt edges and round corners; it is printed on excellent paper in clear type, and is distinctly ornamental.

National Forests and the Water Supply

A most attractive and interesting booklet, "What the National Forests Mean to the Water User," by Samuel T. Dana, Assistant Chief Forest Investigations, has been put out by the Forest Service of the U. S. Department of Agriculture. The four main uses of water—for irrigation, power, navigation and domestic supply—are considered, the author showing that the great bulk of the water supply in the West originates in and is dependent upon the National Forests. The results of forest-destruction are traced, and some of the work of the Forest Service outlined. The booklet is illustrated with a number of very fine photographs.

Engineering Experiments

An investigation of statically indeterminate structures has been conducted by the Engineering Experiment Station of the University of Illinois to obtain a convenient method of analyzing the moments, stresses and deflections for a number of typical structures. The analyses were based upon the assumptions that the connections are perfectly rigid; that the length of a member of a rectangular frame is not changed by axial stress and that the shearing deformation is zero. The method used in the analyses and the equations derived are published in Bulletin 108 entitled, "Analysis of Statically Indeterminate Structures by the Slope Deflection Method," by W. M. Wilson, F. E. Richart and Camillo Weiss. The method has been explained in sufficient detail to enable the designing engineer to use it in the solution of his problems.

Engineering Index Annual

The 1918 edition of the Engineering Index Annual has just been issued. This index which was formerly published by the Engineering Magazine Company is now published by the American Society of Mechanical Engineers. It is a complete index to all engineering material published by technical journals, and as such is a unique work of reference. A concise but adequate description is given of every engineering article published anywhere. The price is \$3.00, postpaid.

The Story of Johansson

An extremely interesting little booklet entitled "The Story of Johansson and His Mysterious Gages" is being distributed by C. E. Johansson, Inc., of New York, to advertise the Johansson Standard Gaging System. In 44 compact pages it tells the story of Johansson's work and experiments, and the problems he encountered during the development of his idea.

Transplanting Buildings

In a neat, profusely illustrated booklet masquerading under the ingenious title "Moving Pictures," John Eichelay Jr. Co. of Pittsburgh show some hundred photographs of their achievements in moving buildings and machinery intact. The booklet is small and compact, and the photographs extremely interesting as illustrations of the apparently impossible feats accomplished by modern engineering and equipment.

Miscellaneous

Throop College of Technology has sent out its quarterly catalog describing courses of instruction, requirements for admission, and giving general information concerning the college.

"Industries and the State under Socialism" is the title of a pamphlet by Rome G. Brown.

The Industrial Accident Commission of the State of California has published a report on special investigations of serious injuries, for the period Jan. 1, 1914 to June 30, 1918.

The latest number of the "Esterline Graphic," issued monthly by the Esterline Company, reviews some actual results obtained with Esterline graphic instruments.

The May, 1919 number of the "National Mazda Stimulator" appears as an attractively arranged booklet featuring house wiring.

Electric Appliances

Large and effective folders have been sent out by the Edison Electric Appliance Company, of Chicago, to advertise the General Electric and Hughes Appliances. Accompanying the folder is a booklet showing, in condensed form, colored reproductions of the company's 1919 spring advertising.

The same company gets out a good window display in the shape of a cutout kitchen scene advertising the Hotpoint Iron.

Fire Protection

An interesting and effective booklet on fire protection has been issued by the Foamite Firefoam Company of New York. A number of very dramatic illustrations, showing actual fires and their subsequent extinction by Foamite Firefoam, constitute a forceful array of evidence.

Annual Report of State Oil and Gas Supervisor

The Third Annual Report of the State Oil and Gas Supervisor of California for the fiscal year 1917-1918 has been issued by the California State Mining Bureau, as Bulletin No. 84. It is a cloth-bound volume of 617 pages, containing a full review of oil and gas development in the state, and results of tests and inspections. A directory of Oil Operators and a full index are appended.

NEW ELECTRICAL DEVELOPMENTS

(The Pacific Northwest reports further particulars of the Cedar River hydroelectric project and a number of improvements and new plans in power developments. The Pacific Central District shows especial activity in the construction of new power lines and in water developments for irrigation purposes, while the Pacific Southwest and Inter-Mountain District report various interesting city improvements and transmission lines.—The Editor.)

THE PACIFIC NORTHWEST

SEATTLE, WASH.—An ordinance is before the city council calling for purchase of \$9100 worth of meters for the lighting department.

SEATTLE, WASH.—Electric lighting fixtures estimated to cost \$10,000 are to be installed in some of the present school buildings. Bids have not yet been called.

FLORENCE, ORE.—The city election resulted in favor of bonding the city for \$2000 for purchasing a Diesel engine to operate the light and water plant for the city.

SEATTLE, WASH.—An appropriation of \$14,000 for completing the Ballard and Yesler Way substations of the city lighting department has been passed by the city council.

VALLEY, WASH.—Arrangements are being made by the farmers on the west side of the valley to erect an electric transmission line from the local system to that neighborhood.

VANCOUVER, B. C.—A large power plant is to be installed on the Similkameen river three and a half miles above Oroville at an expenditure of \$350,000. The power will be used for pumping water for irrigation purposes and for the operation of mines in the district.

ROSEBURG, ORE.—William Pollman, owner of the Roseburg light and water plant, has been inspecting the properties with a view of making extensive improvements. The pumping and power plant on the North Umpqua will be improved and the entire system put in shape to accommodate Roseburg's increasing demands.

WALLOWA, ORE.—The case of the city of Wallowa against the Enterprise Electric Company, alleging poor service and inequality of rates, was dismissed by the Oregon Public Service Commission subject to the fulfillment by the company of certain requirements relative to the filing of service records and plans for the elimination of flat rates.

BREMERTON, WASH.—The naval appropriation bill recently reported to the house calls for an additional \$405,000 for the Puget Sound Navy Yard over and above that provided for in the bill which failed of passage in Congress last winter. Additional items are: filling, grading and construction; seawall \$350,000; power plant \$15,000; additional storage warehouse \$40,000.

SEATTLE, WASH.—Acting Mayor Lane has decided to allow the ordinance appropriating \$30,000 to finance drilling operations at Diablo Canyon and Ruby Creek to become a law without his signature. Plans will be prepared at once by A. H. Dimock, engineer, for a complete investigation of the Skagit project, the first work to consist of borings at the site of the proposed Ruby Creek dam.

YAKIMA, WASH.—Announcement was made here that the Pacific Power & Light Company had closed a deal with the Montana Power Company, by which the former will tie into the big transmission line of the Montana company at Lind and begin taking power from it. The transmission line of the Montana company extends from near Billings to Seattle, carrying a 110,000 volt current. For the uses of the Pacific Power & Light Company this current will be stepped down to 66,000 volts.

MEDFORD, ORE.—J. T. Gagnon, lumber mill operator of this city, has leased the Jacksonville railroad from its original owner and builder, W. T. Barnum. He will operate the road essentially as a supply system for his lum-

ber mill, but will also conduct a freight and passenger business between this city and the county seat. The new owner announces that he will change the name to the Rogue River Valley railroad, will establish a new street car schedule and repair the equipment.

MARSHFIELD, ORE.—An estimate of what it will cost to put the power plant at the Smith mill in good running condition has been completed by the consulting engineer of the power company, Henry Grenacher. It is said to total \$60,000. Four of the twelve boilers at the power plant supply power for the community at large. These the Mountain States Power Company plans to repair by putting in new pipes and rebuilding the dutch ovens underneath, which will cost about \$30,000. The other eight boilers are smaller and are used by the big Smith mill. The \$30,000 repairs on these will mean the rebuilding of the brick work beneath. Two new boilers must be bought.

MARSHFIELD, ORE.—Marshfield, North Bend, East Side, Coquille and Myrtle Point face a condition which may result in suspension of electric power and light, if the intention of the receivers of the C. A. Smith property to withdraw permission to the Oregon Power Company to operate the electric plant at the main Marshfield mill is allowed to be carried out. The probable solution is being considered here by the Oregon Power Company and the public in general. All the motors for generating electricity are centered at the Smith mill, which has been closed for several months. The Oregon Power Company was permitted to operate the engines and boilers and the electric dynamos in order to supply current.

SEATTLE, WASH.—In answer to a letter from the street railway men's union asking for an advance in wages for municipal railway employees that would, it is said, mean approximately \$1,000,000 yearly increase in cost of operations, Superintendent of Utilities Thomas F. Murphine, of Seattle, answered that he could not recommend the proposed increase to the city council. He pointed out that it would be impossible to get the money for the advance asked and stated that while it is true that an increase of one cent in the fare would mean \$1,000,000 more a year if everybody now riding would continue to ride, the experience of other cities showed that 20 per cent increase in fares brought only ten per cent increase of revenue.

SEATTLE, WASH.—Further immediate permanent development of the city's Cedar River hydroelectric power plant at a cost of \$30,000 has been provided for by the utilities committee of the city council in order to care for the increased demand on the city lighting department for electric power. The extension is to consist of a 10,000 kilowatt additional unit at Cedar Falls to be housed permanently as an extension of the existing plant. The estimated cost of the unit is \$280,000, and cost of transmission line necessary for the increased capacity will be \$150,000. An ordinance has already been passed covering construction of a 7200 ft. penstock from the present masonry dam to the power plant at Cedar Falls at a cost of \$195,000. This is the first extension of the Cedar River plant since the failure of the masonry to hold water. The original project was expected to provide a development of 35,000 kilowatts. Since the failure of the dam the city has been conducting

sealing operations on an extensive scale and the authorization of the additional 10,000 kilowatt unit indicates that the sealing promises to be successful.

THE PACIFIC CENTRAL DISTRICT

MARYSVILLE, CAL.—Five miles of new canals to irrigate 600 acres of Yuba River lands have been completed and the water turned in.

CHICO, CAL.—J. B. Thompson, former resident engineer of the Stanford ranch at Vina, has filed on the waters of the Sacramento river, above Nord, and plans the irrigation of 60,000 acres.

PLACERVILLE, CAL.—Geo. F. Lough, land engineer, and R. H. Bennett, manager of the Western States Gas & Electric Company, have started on an inspection of 75 miles of water ditch system to Twin Lakes, the location of a large impounding enterprise recently finished by the company.

GREENVILLE, CAL.—The Trask Copper Mining Company have completed a power line from Englemine to their copper property. Power will be supplied by the Great Western Power Company. This new line will also furnish power for the Ruby Copper Mine, under bond to H. E. Bush.

MERCED, CAL.—Because late rains in the high Sierra prematurely melted the snow packs indications are that the irrigation supply, which is diverted from the Merced River, will be depleted two or three weeks before the usual time, rather than extending to a later period, as was forecasted some weeks ago.

COLEMAN, CAL.—The Northern California Power Company has had to suspend the work of cementing its canal leading to the powerhouse at this place. The \$30,000 job was about two-thirds completed. The company had to turn on the water as it needed more power, and the Coleman plant is the largest of six power houses.

TULARE, CAL.—R. E. Smith, district manager for the Mount Whitney Power & Electric Company, says that with the installation of 159 motors in his division since January 1st, there have been placed under irrigation more than 10,000 acres of land, representing 1623 individual installations. These plants average 10 horsepower each.

RED BLUFF, CAL.—At a recent meeting here property owners representing all parts of Tehama county passed a motion authorizing the appointment of a committee of fifteen landowners to take steps toward the formation of an irrigation district as a part of the Iron Canyon project. The landowners elected are E. L. Sission, chairman, and E. L. Randall, secretary.

FRESNO, CAL.—An expenditure of between \$50,000 and \$60,000 in the extension of its cables in north and east Fresno is announced by the Pacific Telephone & Telegraph Company as a part of its program of service improvement and development this fall. Actual work on the extension will begin in September, according to a statement by Maynard Bailey, superintendent of the Fresno district.

MERCED, CAL.—A petition for the formation of the Plainsburg Irrigation District, to embrace 57000 acres of land in the Plainsburg vicinity, has been presented to the county supervisors. The petitioners propose to establish a

pumping plant irrigation system for this district, similar to the Alpaugh project. It is the plan to connect every five or six pumping plants so that they will supply water together instead of individually.

FAIRFIELD, CAL.—The vast irrigation project which was the result of the attempt of the defunct Solano Irrigated Farms to irrigate the area west of Rio Vista and east of Suisun, has again been revived. This is announced by A. C. Gregory, local civil engineer, who will have charge of the revival of the 48,000 acre project. Gregory said that a continuation of the present activity might result in the beginning of work within the next few months.

WOODLAND, CAL.—The Yolo Water and Power Company has been reincorporated under the laws of the State of Delaware. The new company will take over the old concern and has authorized immediately the issuance of \$2,550,000 six per cent preferred stock. Close upon \$10,000,000 is involved in the reorganization and the development of its projects, but \$3,000,000 will be raised immediately to pay off old obligations. This concern furnished water for most of the rice acreage of Yolo county.

SACRAMENTO, CAL.—The preliminary report of the Assistant State Engineer, Major Paul M. Norboe, covering his investigations of the Big Valley Irrigation Project just made, shows the proposed project to be feasible. Big Valley is situated in Modoc and Lassen counties. The estimated cost of the enterprise is \$30 or \$40 per acre, which is decidedly lower than the estimate placed thereon by the proponents of the project. The report stipulates that there is sufficient water to accommodate 20,000 acres or more.

SUNNYVALE, CAL.—A resolution of intention was adopted by the trustees at a recent meeting to submit to the voters a proposition to acquire a distributing system and facilities for supplying light and electricity to the town of Sunnyvale, and directing the Town Attorney to file with the Railroad Commission a petition requesting that the said commission shall fix and determine the compensation to be paid by the town to the owners of the existing electric system.

MERCED, CAL.—Application to appropriate water from the Merced River, Mariposa county, tributary to the San Joaquin River, has been filed with the State Water Commission by E. N. Rector as follows: 1200 cubic feet per second, for power for generation of electricity for lighting, manufacturing, pumping, etc. Diversion works consist of concrete, steel and wood dam 300 ft. high, and main canal 8 miles long. The amount of water to be stored is 700,000 acre ft. per annum. Estimated cost, \$1,500,000. Construction work will begin about August, 1920, and may be completed in 1922. Water will be returned to Merced River after use.

FRESNO, CAL.—The sale of 30,000 acres of land, sawmills, flumes and plants at Shaver Lake, property of the Flume and Irrigation Company, to the Southern California Edison Company for 2,000,000 for the purpose of developing an \$8,000,000 electric power project to supply Los Angeles with cheap power, has been recently effected. Work on the plants to develop into power the force of water now used for shooting logs down to Clovis through the flume will begin soon. Power produced in this way will permit the elimination of the big, expensive steam plants now used by the Edison Company to develop electric power in Los Angeles. The two million dollar purchase includes 30,000 acres of timber land on Shaver Lake, the water rights, reservoir sites and the flumes used for floating logs down to the mills. It also includes the mills and property of the company in Clovis. This project involves expansion and extension of the Edison company's plant at Huntington Lake, the construction of twenty miles of railroad from Auberry, and the employment of thousands of men.

THE PACIFIC SOUTHWEST

LOS ANGELES, CAL.—That a contest to prove the \$13,500,000 power bond election result invalid will be started as soon as the returns are officially tabulated, is the statement made by Walter J. Little, secretary of the Municipal Taxpayers' League.

LOS ANGELES, CAL.—Machinery for the municipal power plant No. 2 in the San Francisco Canyon is to include hydraulic equipment, electric generators, transformers, auxiliary electric equipment, etc. The cost is estimated at about \$500,000.

ORLAND, CAL.—Owing to increase in rates the Orland Water Users' Association is contemplating the installation of an independent telephone system, the service to be provided at cost to the legal water users in the Orland project. There are more than 700 using water supplied by the association.

LOS ANGELES, CAL.—Wm. R. Wright has filed application with the State Water Commission for 5000 acre feet annually of the waters of Big Dalton Canyon, Los Angeles county, for storage for irrigation and agricultural purposes. The main conduit will be approximately 2500 ft. long and the water will be used on 20,000 acres.

LOS ANGELES, CAL.—It is planned to have the Pacific Electric Railroad center its tracks along Trolleyway Venice from Winward to Marine in order to provide a suitable boulevard from the Venice Boulevard to Marine St.

LOS ANGELES, CAL.—The Sespe Light and Power Company has made application to the State Water Commission for a permit to appropriate 25 cubic feet per second on all unappropriated flow of the waters of the Sespe River, Ventura county, tributary to the Santa Clara River. The water is to be used for agricultural purposes.

LOS ANGELES, CAL.—Specifications for the installation of the ornamental lighting system on Broadway from California street to Tenth street have been approved by the Public Service Commission. The system will consist of 134 lamps mounted with two 1600-cp. lamps. A temporary system is now being installed to be used during the change from the old to the new system. The cost is estimated at about \$100,000.

PALO VERDE, CAL.—Joseph F. Graham has applied to the State Water Commission for 3 cubic feet per second of the waters of Palo Verde Lagoon, Imperial county, tributary to Colorado River, for agricultural purposes on 80 acres. Water will be pumped out of the lagoon by one 3½ inch and one 5 inch American centrifugal pump; total lift, 12 feet. The pipe line will be one-quarter mile long, and the estimated cost \$60,000.

PHOENIX, ARIZ.—A special election was held June 19 to vote on the issuance of \$1,300,000 bonds for a new gravity water supply system for the city. The project involves the construction of an infiltration system in the Verde river about 33 miles from Phoenix, a 42-inch pipe line 157,500 feet in length and a reinforced concrete reservoir of 25,000,000 gallons capacity located on one of the mountains adjacent to the city. L. B. Hitchcock is the city engineer and Hiram Phillips, St. Louis, Mo., consulting engineer.

YUMA, ARIZ.—The Southern Sierra Power Company of California has entered into a contract with Sanguinetti & Ewing, of Yuma, Arizona, for the extension of its electric power transmission system to the irrigated districts of this region for the purpose of using the power to operate pumping plants and certain types of farm equipment. The Yuma Gas, Light and Power Company opposed the entry of the Southern Sierra Power Company to this field and it appealed to the State Corporation Commission of Arizona to issue an order against the power lines of the California corporation entering that State. The Corporation Commission, however, refused to take any part in the fight between

the two companies and the proposed power lines will be built, it is announced. Twenty thousand acres of land will be placed in irrigation, in addition to the area already watered from pumping plants.

THE INTER-MOUNTAIN DISTRICT

BUTTE, MONT.—The Butte Electric Railway is to begin at once paving the track on West Granite street. The cost will be from \$25,000 to \$30,000.

BUTTE, MONT.—The consolidated income of the Montana Power Company for the four months ended April 30, 1919, as submitted to the New York Stock Exchange, shows gross earnings of \$2,430,641, and a surplus of \$338,388.

WINNEMUCCA, NEV.—Construction work on a power line to Thorne, to the property of the Simon Lead Mining Company in the Simon district of Mineral county, will be started at once, according to P. A. Simon, president of the company. It will be fifty miles long and will cost about \$78,000.

SALT LAKE CITY, UTAH.—The electrification of the Salt Air Railroad, to Salt Air Beach, is so near completion that it will be in operation before the end of June. The automatic substations have many novel features. The electric cars are now on the way from the East, traveling on their own wheels.

BATTLE MOUNTAIN, NEV.—Engineer O. P. Adams, with the assistance of Lorenzo D. Greel, special supervisor representing the Reno Indian Agency, finished laying out a town site on the Executive order reservation set aside for the Shoshone Indians. The well from which it is expected irrigation water will be drawn is located in the center of the place. It will be sunk under the supervision of F. L. Bixby, now on the staff of the University of Nevada.

FALLON, NEV.—Representing the Nevada Valleys Power Company, which furnishes the city of Fallon with electricity, F. J. Early appeared before the County Commissioners with an application for a new franchise to extend over a period of fifty years. Early said his company desires to install a large power development plant on the Truckee river and that it will be necessary to float forty-year bonds. He said the lease now held by his company on the Government hydroelectric plant at Lahontan dam would be renewed if the Government authorities are agreeable. This lease expires in three years.

RENO, NEV.—That direct telephone toll line from Reno to Tonopah, and to Goldfield, connecting with other Southern Nevada points, will be constructed, has been announced by officials of the Bell Telephone Company of Nevada. The officials are now on their way to Tonopah. At the present time Yerington is as far south as telephone connections can be made from Reno.

BOISE, IDAHO.—The Idaho Power Company is planning to erect a transmission line from American Falls to Pocatello, a distance of 25 miles. The company is now installing a 3600 kva. generating unit at its Lower Salmon hydroelectric plant.

FALLON, NEV.—Project Manager John F. Richardson and Project Counsel R. M. Patrick spent several days in conference with J. L. Savage of the Denver office of the reclamation service. Savage is the designing engineer of the service and the three men went over the scheme of building the Horseshoe dam structure at a point about nine miles above Gardnerville where a site has been determined upon. As contemplated this dam will be 222 feet in height, will cost \$1,300,000, and will impound about 60,000 acre feet of water. The storage thus effected would be used in the Gardnerville, Minden and Dayton vicinities, and would make possible the bringing under cultivation of many thousands of acres of fertile lands now unused in the upper valley through the lack of irrigation water.

THE VACUUM CLEANER

THE VACUUM CLEANER

AN EMPTY BOTTLE was suggested as an appropriate symbol for the Vacuum Cleaner department on this, the first of July. But aside from the implication of dry reading, it is necessary to point out that the characteristic thing about a Vacuum Cleaner is not the emptiness of its vacuum, but rather the variety of objects it has found with which to satisfy itself. Some of the matter thus collected is here displayed—such odds and ends of other people's lives as find their way from time to time into an editorial office and are picked up by the office Vacuum Cleaner, to appear later in its capacious bag.—The Editor.



Discovered—Twins!! Or rather, they seem not to have been discovered until after the publication of the June 15th issue of the Journal of Electricity. For one of these gentlemen is Major Sever, formerly representative of the War Industries Board on the



Pacific Coast, and the other is Lieut.-Col. Richard Park of Berkeley, Cal., both well known to electrical men of the West. Unfortunately, Colonel Park, who here appears on the left, masqueraded under the title of Major Sever on page 593 of last issue. Apologies are offered—but do you blame the compositor?

When the town goes dry, not only will a load be lifted from the sheriff's shoulders but, we understand, a load will be lifted from the electric power industry as well. The power demand of breweries and distilleries, as well as the lighting demand for many a corner property, will be withdrawn. Most of the towns that went "dry" during the war recouped their losses by the war prosperity which began to show itself about that time, but now these towns that go "dry" will see temporary depression and the lighting company will receive a severe setback in revenues from loss of this class of business. To assist this condition, the business department of one large electric company has issued a booklet for distribution among the liquor trade in towns supplied by them in order to assist the new business departments in replacing lost business. The midnight soda fountain may be expected soon to make up the deficit.

The wedding at high noon need no longer flourish in the land. The information is submitted for the social guidance of any electrical man contemplating the fatal step. It seems, apropos of July 1st and its accompanying phenomena, that noon is the traditional hour of the wedding ceremony, because in the olden days in England the bridegroom could not be relied upon to be sober any later in the day.

THE BURIAL OF SIR JOHN BARLEYCORN

(Written the morning after)

I

Not a cheer was heard, not a joyful note
As the corks from the bottles we hurried;
Not a soldier could drink a farewell shot
And even Frank Watts looked worried.

II

We buried him darkly at dead of night
The while through dark glasses gazing;
By the staggering moonshine's tipsy light
And the Mazdas our visions dazing.

III

Few and short were the prayers we said
As we tried fifty cents to borrow,
To buy a Scotch whisky for spinning head
Which would bitterly ache on the morrow.

IV

We thought as we swallowed this good-bye drink
With our eye-balls tearfully streaming,
That never again an 'igh ball we'd sink
And our joys 'd be only in dreaming.

V

Sadly we talked of the spirit that's gone
And o'er our last drink repined him;
But little he'll wreck if they let him sleep on
In the grave where our Congress consigned him.

VI

We drank it down and hardly had done
When outside the bar-room calling
We heard the rough voice of a son-of-a-gun
Of a prohib "never more" bawling.

VII

Slowly and sadly we all walked down
From that room in the second story;
The bottles were placed on the cold hearthstone
And left him alone in his glory.

—A. H. H.

ENGINEERS OF YESTERDAY—12. NEWTON

(Series compiled by A. L. Jordan)



If an apple falls to the earth, does the earth rise to meet the apple?

Since gravitation is mutual, the answer is theoretically, Yes; practically, No, in the sense that it cannot be measured. Newton (born 1642, the year of Galileo's death), is regarded as the greatest scientist and mathematician who ever lived. He published the famous law of gravitation (the force between two bodies is directly proportional to the products of their weights and inversely proportional to the square of the distance between their centers) in 1666; invented his reflecting telescope in 1668; discovered the cause of white light being separated into colors by a prism in 1672; published the law for the velocity of sound in 1676, his three laws of motion in 1687 and the law for the rate of cooling of heated bodies in 1698. He performed experiments in many other lines, notably in electricity, and his great mathematical writings are still used. He became Chancellor of the Exchequer, Master of the Mint and President of the Royal Society. He died, a bachelor, in 1727.

THE VACUUM CLEANER

THE VACUUM CLEANER

PL B L I C L I B R A R Y

JOURNAL OF ELECTRICITY

VOL. 43. NO. 2.

SAN FRANCISCO, JULY 15, 1919

PER COPY, 25 CENTS

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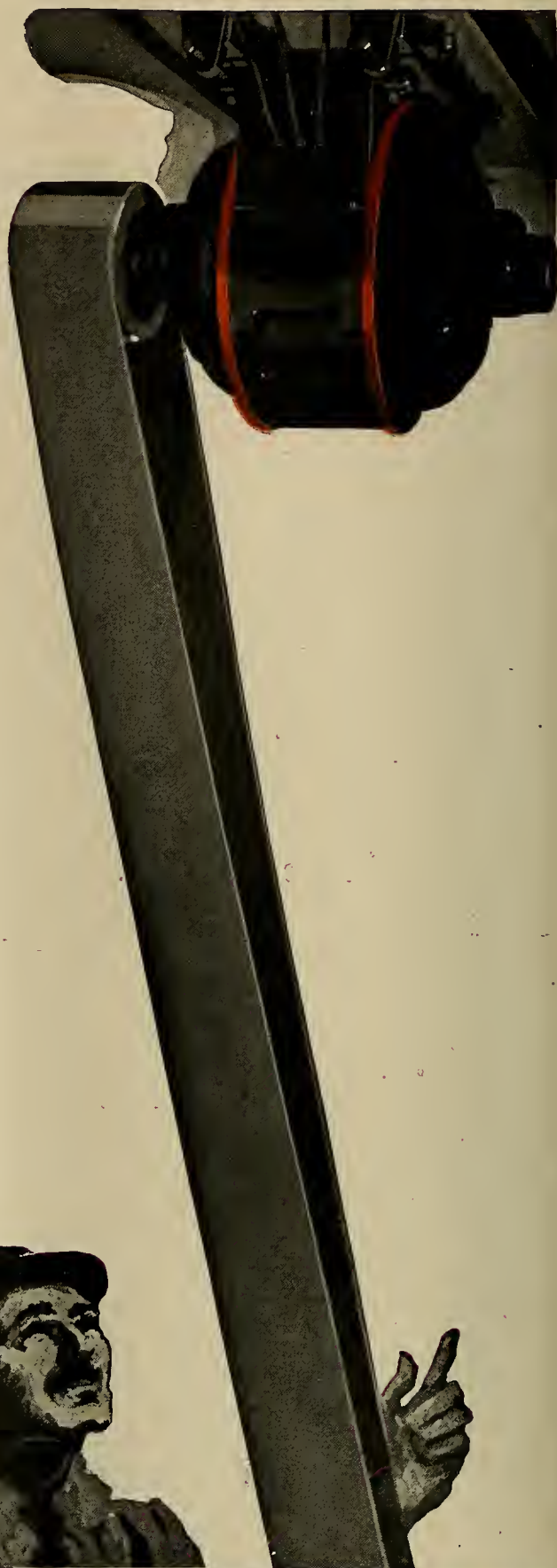
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JOURNAL OF ELECTRICITY

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ROBERT SIBLEY, Editor

CLOTILDE GRUNSKY, Associate

VOLUME 43

SAN FRANCISCO, JULY 15, 1919

NUMBER 2

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NOT ONLY HAVE NEW RECORDS in high voltage transmission been achieved in the West and from here passed into more general use elsewhere, but the West has contributed as well valuable research in high voltage and high frequency phenomena which in large measure have made possible the sending of radio messages across oceans and continents, a factor which played so important a part in the war. The high voltage laboratory of the Federal Telegraph Company at Palo Alto, California, more detailed pictures of which appear elsewhere in this issue, has been the scene of the most important experimental work along these lines—and it is here that questions of yet higher tension transmission of vast importance to radio telegraphy are now being studied. The picture reproduced above shows a corona and flashover on a 37 in. porcelain pedestal (standard 110,000 volt insulator for 60 cycle work) equipped with a corona shield at 234,000 volts and 51,000 cycles per second. Present indications are that the formation of the corona at very high voltages will limit the tension at which transmission is practicable. A high frequency exaggerates the effect with the interesting result of a sudden drop in the voltage when the corona is formed. As a result of these experiments a modified type of insulator better suited to withstand high frequency and high voltage conditions has already been developed and further results of practical value to the electrical industry are daily developing.



JOURNAL OF ELECTRICITY



DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43

SAN FRANCISCO, JULY 15, 1919

Number 2

(Copyright 1919 by Technical Publishing Company)

In the pocket of a dead American boy was found the following pledge. It was a creed to die by — in these times of peace it is a creed to live.

TO base my expectations of reward on a solid foundation of service rendered; to be willing to pay the price of success in honest effort. To look upon my work as an opportunity to be seized with joy and made the most of, and not as a painful drudgery to be reluctantly endured.

¶ To remember that success lies within myself, in my own brain, my own ambition, my own courage and determination. To expect difficulties, and to force my way through them; to turn hard experience into capital for future struggles.

¶ To believe in my proposition, heart and soul; to carry an air of optimism in the presence of those I meet; to dispel ill temper with cheerfulness, kill doubts with a strong conviction, and reduce active friction with an agreeable personality.

¶ To make a study of my business, to know my profession in every detail, to mix brains with my efforts, and to use system and method in my work. To find time to do every needful thing by never letting time find me doing nothing. To hoard days as a miser hoards dollars; to make every hour bring dividends, increased knowledge or healthful recreation.

¶ To keep my future unmortgaged with debts; to save as well as earn. To cut out expensive amusements until I can afford them. To steer clear of dissipation and guard my health of body and peace of mind as a most precious stock in trade.

¶ Finally, to take a good grip on the joys of life; to play the game like a man; to fight against nothing so hard as my own weakness, and to grow in strength, a gentleman, a Christian.

¶ "So I may be courteous to men, faithful to friends, true to my God, a fragrance in the path I trod."

The remarkable utterances of R. H. Ballard appearing elsewhere in this issue should command the thoughtful attention of all branches of the industry. The year of years is ahead for the electrical industry in the West. Indeed the whole world, in these days of gigantic readjustment, must feel the invigorating stimulus of the method electrical in the immediate years ahead. Information concerning the high ethical standards of this great industry and what it is today accomplishing for the upbuilding of the West must be made to pass out to the public through every known channel of expression. The contractor-dealer in his contact with the public has an unusually direct avenue of approach. Here, then, is a real service open to him, and we believe that through this vital channel of expression the manufacturer, the jobber,

New Message to the Electrical Industry

the central station, and indeed the contractor-dealer himself will profit—for in an enlightened public-sentiment lies the real hope for the greater utility service of the immediate future.

The approaching convention of the Northwest Electric Light & Power Association, which is to convene at Seattle Sept. 10-12, 1919, is already engaging the attention of men of the electrical industry throughout the West. It is quite generally recognized that the Northwest has ever proven a leader in the solution of many of the problems that have perplexed the great electric power industry west of the Rocky Mountains. It is for this reason that the forthcoming convention is being recognized as one of great importance and already reservations are being made, through the Journal of Electricity in San Francisco, looking toward the planning of a special car for those who would journey northward to this convention the middle of September.

It is believed that the high quality of papers that are being prepared and the excellent leadership under which the convention is being planned this year call for hearty support from all quarters of the West. Men prominent in the industry from practically every power center west of the Rockies will be in attendance and we confidently predict they will not be disappointed in the resulting good acquired from attendance at these sessions.

It is well, at this season of the year when engineering societies are planning activities for the new year, that a brief statement be made of some of the problems that confront the engineer.

Some Problems Confronting Engineers

One of the gravest problems is that of defining the status of the engineer himself and formulating a vision for his future activities. Practically all of the national engineering societies are giving attention to this important subject through committees on aims and organization. The consensus of opinion seems to be that the closest cooperation should be encouraged among local and national engineering organizations. This cooperation should be of such a wholesome nature as to broaden the outlook of the engineering profession and encourage the engineer to take a more active

part in the political and civic affairs of the community of which he is a part.

Some of these political and civic duties ahead affect very particularly the present status of the electrical engineer. The water power problem and the electrification of railways are daily assuming newer and higher responsibilities in the affairs of our national economic life. Already the brightest brains are engaged in an attempt to solve these problems and it is believed that the intensive study of these questions on the part of great national bodies, such as the National Electric Light Association and groups of engineers of highly specialized training, similar to that undertaken by the San Francisco Section of the American Institute of Electrical Engineers—outlined at some length elsewhere in this issue—must of their very weight bear fruit in abundance.

Water supply in municipalities of the West has long been known to be inadequate in many of the larger communities. Before the present season is over unquestionably the people generally will consider most seriously the enlarging of storage facilities in many quarters.

California this year is experiencing a shortage of water for power and irrigation that has in some localities not been felt for many years. Citizens of California are gratified that much of the fruit and intensively cultivated areas are not suffering, due to superbly designed electrical pumping facilities. But the lesson of water shortage should make all consider the seriousness of the situation. In eastern Washington, Idaho and western Montana, the condition of affairs is vitally distressing and it is to be hoped that another such season in these newer communities will see carefully planned storage facilities adequate to tide over such a situation as experienced this year.

In the May 15th issue of the Journal of Electricity, the possible issuance of a code of ethics for public utility practice by the Bureau of Standards was editorially discussed and condemned as an infringement of the province now ably cared for by the State Railroad and Public Utility Regulating Commissions. Such questions, it was felt, could be handled more intelligently by those in immediate contact with the local situation. On page 57 of this issue appears a communication from Dr. E. B. Rosa, chief physicist of the Bureau of Standards, in which he denies the intention by that organization of the formation of such a code and further states that in no way does his bureau intend to interfere with rate regulation from above.

Journal of Electricity is pleased to find, therefore, that the former editorial of May 15th appears to have been unnecessary and that the Bureau of Standards is not contemplating this extension of its work.

The further question of the National Electrical Safety Code and its application to Western conditions is also taken up by Dr. Rosa in his paper. This matter is of vital importance—perhaps the most discussed problem in the public utility field of recent weeks—and the history of the case as here presented deserves careful attention. The standpoint of engineers of the Northwest in regard to the acceptance of the code is to be found in the article by Geo. E. Quinan on page 54 of this issue.

Perhaps the most striking characteristic of this period with all line engineering and electrical societies is the fact that each is analyzing its present relationships with its members and in some measure contemplating a reorganization with a view to making the society a more vital factor in the problems of its field the country over.

In view of this fact, the suggested program for the meeting of a local section, which comes in this case from the Philadelphia Section A. I. E. E., has a particular timely interest. This branch took as a basis for discussion the preliminary report of the Committee on Development of the A. S. C. E. as follows and applied it to the local situation with extremely practical results:

THE RELATIONS OF THE INSTITUTE TO ITS MEMBERS

1. What, if anything, can properly be done to stimulate the interest of the individual member in the organization and to increase his participation in its activities?

(a) How can the Institute be made more useful to you through its meetings, proceedings, or otherwise?

(b) In what way can you be more useful to the Institute?

2. Should the present method of holding stated and special meetings of the Institute and of its various sections and branches, at which technical papers are presented and discussed, be continued, either in its present form, or by either increased or diminished frequency of meetings, or under any change as to their scope and character?

3. Are there other forms of Institute activities in which we can engage with profit, either as substitutes for, or as supplementary to, our present activities?

4. What, if any, changes in the official organization and the method of conducting our affairs could be adopted to advantage? Can our present machinery for obtaining the collective views of our widely distributed membership be improved? If so, how?

THE RELATION OF THE INSTITUTE TO OTHER ENGINEERING ORGANIZATIONS

1. Is closer cooperation between the Institute and other engineering bodies, either local or national, desirable? If so, what is the best method in order to obtain the benefits of cooperation, and at the same time preserve the individuality of the bodies concerned?

2. Should the local sections of the national and perhaps other societies have joint organizations or affiliations and if so, to what extent should these be in addition to or substitutes for, present practice?

3. Would it be desirable for the four national engineering societies, and perhaps others, to arrange to hold annual, or less frequent, conventions at the same time and place, so that what might be called an Engineering Congress could consider and pass upon the most important matters of common concern to engineers and upon those affecting public welfare?

RELATION OF THE INSTITUTE TO THE PUBLIC

1. Should our organization become more active in public affairs of the cities, states and nation? and if so, how can we most readily make our influence felt?

2. In what way, if any, can relations between engineers and the other professions be improved; also their relations with industry, finance and education, etc.?

3. In what other ways can the Institute take a useful part in connection with public affairs?

The above questions were simply suggestive. It is to be expected that other matters of local importance will come up at such a meeting—which may prove a most profitable way of reconsidering society problems and of putting an organization in working shape to be a real factor in the solution of the problems of its field.

The lack of organization between the great societies of engineers has been felt in Canada as it was for some time in the United States, and there as here, there have been attempts to organize a new single society which shall include all engineers and shall be of weight in the body politic, working toward the recognition of the standing of the engineering profession, rather than merely technical advance.

But the technical side should not be neglected and it is interesting to see that the present tendency is toward the evolution of joint engineering councils between local sections of the present organizations, with a further national council also made up of representatives from the four major societies. This provides avenues for purely society business and at the same time a unity of action which gives a standing to profession in local and national affairs. The development of the engineering profession in Canada is of as great interest to the engineers of the United States as their own and the growth of this movement will be watched with hearty good will.

One of the great good possibilities resulting from the world stress due to war is that scientific thought, focused during trying periods of war upon the solution of hitherto unencountered problems of vast magnitude, will in the years immediately ahead bear fruit in invention that will forward the human race in the easing of its burdens and in advancing the general state of contentment of the people.

On all sides we hear of new and helpful progress in scientific advance. The work of L. F. Fuller, Chief Electrical Engineer for the Federal Telegraph Company at Palo Alto, California, enabling the accomplishment of new world records in wireless telegraphy, and of E. S. Pridham and his co-inventors of San Francisco in making possible the flight of the NC-4 in its recent crossing of the Atlantic, due to wonderful new improvements in wireless telephony, but bespeak the activities in the West that are today being felt the world around.

Bearing in mind this fact, the survey of research activities that is being undertaken by the San Francisco Section of the American Society of Mechanical Engineers is timely and well worthy of emulation by other scientific and engineering societies. This particular survey is under the guidance of no less an international authority in research than that of Dr. W. F. Durand of Stanford University.

In making any survey of this sort it is well to

bear in mind that the term research is to be used in its broadest sense. It is in essence a search for something new, an effort to enlarge the boundaries of present engineering knowledge, or again a search for an improvement on existing methods, processes or conditions; and the subject matter of such search or investigation may relate to engineering, or to industry, and in any or all of their manifold phases as they come within the normal scope of the activities of the engineer.

The value of such surveys, where undertaken in the broadest sense of cooperative helpfulness, can hardly be overestimated. Here is an immediate opportunity for colleges, universities, technical and engineering societies, and manufacturing concerns to take stock as it were and by helpful surveys and compilations of work thus far accomplished, give added zest and enthusiasm to the years immediately ahead, that are bound to bear fruit an hundred fold.

An interesting perspective of after-the-war conditions in the Northwest is to be gathered from impressions of business men who have recently visited that region. Much of the labor unrest which to him seems to be acute in this district is laid to the difficulties of adjustment from uneven war conditions. War industries had caused a large influx of people into the industrial centers and a consequent shortage of homes, and accompanying high prices. The public utilities in these centers were taxed to the limit to meet the demands on them, and the utilities in the interior were compelled to meet increased costs with no increase in revenue, until comparatively recent date. The resultant variation in wage scales is acute and is one of the important features to be balanced in the economic readjustment. It will undoubtedly take a considerable period for this condition to be entirely relieved.

In the mountain regions, where mining has played an important war-time part, a large amount of excess power is now available since the reduction of the mining activities. The question of what to do with this spare power is now confronting the utilities. The electrification of main line railroads offers one solution of the difficulty. The Northern Pacific paralleling the Chicago & St. Paul Railway, the Great Northern Railway north from Butte to Great Falls, and the Oregon Short Line from Butte to Salt Lake City, are lines which might be electrified to good advantage. These lines are practically paralleled at the present time by high tension transmission lines already supplying power for other uses.

THE NEW JOURNAL SERVICE: The "Farm Number" of the Journal of Electricity planned for August first marks a new level of achievement in service to our readers. An important survey of the use of motors on western farms, in irrigation pumping, canning and packing plants, will form the main feature of this issue—but the other aspects of electricity in farm life and the methods of reaching the farmer will not be neglected. It is to be a banner issue—make sure of your copy ahead of time.

Attention is called to the two pages on future issues and present policies of the Journal of Electricity which appear regularly in our advertising columns. Notices of interest to both readers and advertisers will always be found on these pages.

The National Electrical Safety Code

BY GEO. E. QUINAN

(Whether a national safety code be possible which will not prove unduly irksome under Western conditions, or whether a separate code should be determined upon under the authority of the railroad commissions is one of the most important problems now before the electrical industry of the West. The following discussion of the problems, the aims and the building up of the present national code is by the engineer of the Puget Sound Traction, Light and Power Company, and formed the substance of a paper recently read before a joint meeting of the A. I. E. E. and N. E. L. A. at Portland, Oregon.—The Editor.)

Scarcely more than forty years ago the commercial generation and distribution of electric power was unknown. Thirty years ago electric power transmission over any considerable distance was not commercially possible. As late as the year 1900 the transmission lines of the country could almost be counted on one's fingers, while today the generation, transmission and distribution of electric power represents the investment, in this country alone, of two and one-half billion dollars, and the central station industry ranks fifth or sixth among the great industries of this country.

Progress of Standardization

That the standardization of practice should have lagged somewhat in this rapid development was not only inevitable, it was essential to a robust growth and to the best interest of the country. In many branches of the electrical art standardization has followed as closely on the heels of development as could be desired by the most exacting academician. Standards of language, of units, of apparatus and equipment, of voltages, frequencies, etc., etc., have been developed almost as rapidly as the theory and experience on which they rest. It is safe to say that in no other art has standardization been so consistently and intelligently carried forward.

In the individual practice of Central Station utilities, however, there has been great divergence both in design and construction and in operating methods. Even today many utilities have no clearly defined standards for types and sizes of equipment, not to mention their electrical characteristics, and in construction and operating practice much is still left to the judgment or lack of judgment of the foreman.

This is especially true as regards line construction. Rule of thumb methods still prevail. Sags and tensions in conductors, far from being standardized, are not even known, and where there should now be available a valuable fund of knowledge gleaned from experience, of the character and magnitude of the stresses to which line structures are subjected by the elements, very little indeed has been accumulated.

Efforts of the National Electric Light Association

While the foregoing statements are true of many Central Station utilities, there are numerous instances in which excellent standards of practice have been developed, and uniformity of practice as between different utilities has been materially furthered by the National Electric Light Association. In 1910 this Association undertook, through a committee, the preparation of a specification for line construction which would insure safety, especially at crossings with railroads and telephone lines. The work of this committee was published the following year and has since come to be known as the "1911 Specification." Although prepared by engineers and operators of recognized ability it proved so inadequate, and so unacceptable to the membership of the Association generally, that it was never officially adopted. The failure of the 1911 Specification was due to lack of recognition of the magnitude of the undertaking. I believe I am right in saying that there was no representation on the committee from points west of the Mississippi River and that neither the line-men nor the public were at all adequately represented.

While the 1911 Specification was prepared for reference purposes, and was never intended to become compulsory, it

was published at a time when the promulgation of safety measures by legislatures and other state bodies was meeting with much popular favor. Notwithstanding its many deficiencies it was promptly seized upon and made the basis of regulatory codes in a number of states. Perhaps the least objectionable and most consistent of these measures was the statute enacted by the Washington legislature in 1913. The rules of this statute have since been added to by the Public Service Commission, and are still in effect.

National Electrical Safety Code

At about this time it was announced through the technical press that the United States Bureau of Standards, in response to numerous requests from state bodies and after careful consideration of the need for such action, had begun the preparation of a "National Electrical Safety Code" with the intention that it should be adopted as a regulatory measure and made mandatory throughout the country. State commissions were requested by the Bureau to defer individual action and the cooperation of all parties in interest was earnestly requested and very generally obtained.

In August, 1914, Part IV of the Code was published as Circular No. 49 of the Bureau. It embodied rules to be followed by employers and employees in the operation of electrical apparatus and lines.

This was followed by the publication of the other three parts in April, 1915, as Circular No. 54. A month later a revised edition of Circular No. 49 was brought out and in November, 1916, the four parts were combined in a revision of Circular No. 54, which was issued "for examination, trial and constructive criticism." A second edition of the November issue was soon necessary and there are today thousands of copies in use in all parts of the country.

In addition to two introductory sections giving definitions of terms and rules for the grounding of apparatus and circuits, the Code consists of four principal parts:

- Part I—Covers the installation and guarding of machines, switching equipment, and wiring in power stations and substations.
- Part II—Embodies rules for the construction and maintenance of power lines and signal lines, both overhead and underground.
- Part III—Regulates the placing of electrical equipment and wiring on the premises of the consumer.
- Part IV—Consists of rules for the guidance of employers and employees in the operation of electrical apparatus and lines.

From the foregoing it will be seen that the National Electrical Safety Code is almost exclusively concerned with the Central Station, its employees and its customers. While Part II provides certain requirements for signal lines they are relatively few. To quote from a publication of the Bureau, "The signal utilities, including telephone and telegraph companies, are concerned only incidentally with the rules for reducing electrical hazard."

Safety Conferences

After the publication of Part IV in 1914 a series of conferences were held between the Bureau's representatives and engineers and operators from all parts of the country. At these conferences, which continued at intervals for more than two years, all parties at interest, including the electrical workers and various regulatory bodies and inspection bureaus, were represented.

At these conferences the various parts of the Code were revised, rewritten and revised again, until in November, 1916,

Parts I, II, III and IV had been brought to a state reasonably satisfactory to all parties, and in the time since then little if any need for change has developed.

Safety Factors in Line Construction

With Part II, however, difficulties were immediately encountered. This part relates to the construction of lines and must specify the minimum requirements actually essential to safe construction, but no more. The other parts were concerned with the guarding and isolation of apparatus and wiring, and with instructions to workmen. Part II presented an entirely different problem. Rules for the design of the line must be worked out. Strengths of materials must be considered and stresses determined.

The first draft of Part II bore a strong resemblance in some respects to the 1911 Specification before referred to. The line structure was a bridge; conductor weights and tensions and the weights of supports were the dead loads. It was assumed that the elements would with reasonable certainty supply, at intervals, the live loads in the form of ice and wind, and temperature variations. It was only necessary to decide how thick the ice, how strong the wind and how low the temperature, and then select a factor of safety. Nothing could be simpler, more logical or more irreconcilable in the result with actual practice. Lines were found, plenty of them, which had been standing for years but which, by all the rules, should never have survived their first winter. A line in Spokane showed a safety factor of only 38% and should have been prostrated by the first summer breeze, but a steel bridge in collapsing lurched sideways through it, snapping the nearest pole and leaving the top suspended without injuring the rest of the line.

Even with factors of safety absurdly low the resulting construction which would be required was found to be stronger (and more costly, of course) than experience indicated was necessary. It was apparent from these considerations that there were factors in the problem which would prove difficult of determination. It was also evident that if the assumed stresses were to lie within the range of those actually obtaining, as measured by the successful resistance of existing construction, and were to be defined in terms of ice thickness and wind velocity, then the values of these latter quantities must either be less than experience would seem to justify or the factors of safety must be made extremely low.

Conflicting Interests

There was nothing in the situation, though, to have prevented a reasonably workable solution had it not been for the insistence of the Telephone interests on what was felt by the Central Station men to be unreasonably costly construction at crossings and in conflicts with signal lines. Through their splendid organization they were able to maintain a strong position in each discussion as it arose, and the power men, who proved deplorably weak in this regard, found themselves constantly handicapped by lack of definite facts and figures. Thus the line rules have been, from the first, a subject of controversy, and the Signal utilities, who "are concerned only incidentally with the rules for reducing electrical hazard," have had a preponderating influence in their formulation.

It is unfortunate that such a situation should have developed. Not only was it desirable that these rules should be as simple as possible, leaving the widest latitude for developments in the art, but it was essential that no unnecessary burden of cost should be created if the benefits of electric service are to become general. The art of distributing electric power to small communities, and especially to detached dwellings, in the great agricultural areas of the West, and the extension of Central Station service into the forested regions of Oregon and Washington presents many problems, the solution of which has barely begun. These problems are

essentially concerned with the selection of voltages and the construction of lines, for secondary transmission and distribution. Costs per mile must be reduced. Types of construction must be devised using less costly supports and fewer of them. Cheaper conductors, smaller if of copper, must be used, necessitating higher voltages, and small transformers for these voltages must be provided at moderate cost.

These problems have naturally appeared first in the West and to a lesser degree in the Middle West. There is more mileage of transmission lines in the Rocky Mountains and Pacific Coast states than in all the rest of the country. Rural distribution in the East has taken the form of lines radiating from the cities and towns, the average distances being moderate and the voltages materially less than those necessary in the sparsely settled West, where even small towns are infrequent. The comparative cheapness and availability of fuel has also, heretofore, had much to do with the simplification of eastern transmission problems.

But old conditions are rapidly changing. With the mounting cost of labor and the increasing congestion on the railroads the price of coal has gone skyward, and its availability at any price, delivered to the Central Station, is becoming uncertain. It does not require the vision of a seer to foresee the coming of a need for profound changes in Central Station practice in the eastern part of the country. Water powers not heretofore considered because of distance must be developed, and steam generating stations must be so located as to eliminate or at least minimize the haulage from the mines. The railroads must adopt electrification for many of their lines if for no other reason than to reduce the haulage of coal for locomotives. There are at present under way in some of the eastern states projects for the location of huge generating stations adjacent to coal mines, with extensive high voltage transmission systems to the centers of distribution. Considered heretofore as not economically feasible, they are now taking tangible form.

The vital, increasing and already predominating importance of line costs renders it essential to the common welfare that great wisdom should be used in placing restrictions on construction methods. Each restriction should be so specific as to affect only the condition which it is desired to correct, and it should be clear that the benefit to be gained is worth the price which the community must pay for it.

While the line rules as published in 1916 were unwarrantably stringent in some of their requirements they were much improved over the 1915 issue, and there is reason to hope that as a result of the revision which is now being made they will be still further materially bettered.

Scope of Line Rules

For those who are not familiar with Part II of the Safety Code, I will attempt to describe, without too great detail, its general scope and the form which the rules have finally taken, as a result of numerous compromises and consequent changes in their general treatment.

After defining in two preliminary sections the sense in which various terms are used, and describing in detail how grounds, where required by the rules, shall be made, tested and maintained, the line rules proper are introduced with a paragraph defining their scope and the method of their administration. This may be summarized by saying that they are intended to apply to new construction and reconstruction only—that is, they are not intended to be retroactive—and they are to be administered under state authority, as by Public Service Commission, Industrial Accident Commission, or similar bodies.

Classification of Hazards

The general method of treatment is to define (for power lines) three grades of construction, A, B and C, which are required to be used under different conditions of relative hazard.

These conditions, broadly speaking, arise from combinations of two or more of the following four factors:—

1. Voltage.—Since voltage is a factor in almost all electrical hazards, the voltage classification constitutes a very important part of the Code. Relative hazards due to voltage are classified as those due to voltages under 750 volts; between 750 volts and 5000 volts; between 5000 volts and 7500 volts; and over 7500 volts. In addition, lines between 300 volts and 750 volts are still further distinguished for certain purposes.

It will be seen that the steps of this classification have been chosen with reference to the voltages commonly used in distribution work up to 6600 volts. A simpler and better classification would result by omitting the step from 5000 volts to 7500 volts, and thus placing in one class all circuits between 750 volts and 7500 volts, but this was opposed by the Signal utilities on the ground that protective devices for their circuits were not available above 5000 volts.

2. Location of line with reference to other lines.—If a line in overturning would involve the conductors of another line it is said to conflict with the other line. The upper line at all crossings conflicts with the lower line, and parallel pole leads are often each in conflict with the other.

3. Location of line with reference to traffic.—The degree of hazard where traffic is dense is distinguished from that where traffic is infrequent by describing these respective situations as urban districts and rural districts. Lines in the former situation are required to observe a generally higher grade of construction than those in the latter.

Railroad crossings are deemed to constitute a condition of especial hazard, and all lines crossing over main line railroads are required to use the highest grade of construction, grade A, at the crossing. For crossings over sidings and unimportant branches grade B construction is required.

4. Relative levels.—The relative levels of power wires of different voltage classifications, and of power wires and signal wires, is also a factor in determining the grade of construction to be used. Thus secondaries, strung above primaries, must observe the same grade of construction as would be required for the primaries if the positions were reversed.

These four general classes of hazard, singly or in various combinations, determine the grades of construction required of lines in different situations. Thus grade A construction is required at railroad crossings regardless of voltage, while power lines crossing over telephone lines take grade A, B or C, depending on their voltage. Similarly, grade B is required for supply lines of over 7500 volts in urban districts even when not in conflict with other lines, while in rural districts grade C is specified. The three grades of construction, A, B and C, are equivalent to construction with factors of safety graduated to correspond to different degrees of hazard, being highest for grade A, and lowest for grade C, with grade B intermediate. Instead of directly specifying different factors of safety, however, different loadings are specified, with the same factor of safety for all grades, which leads to the same result and avoids the difficulty, before mentioned, of specifying safety factors which would appear unjustifiably low.

The Weather Factor

Since the weather plays a controlling part in the production of stresses on the line structure, and since the severity of weather conditions varies geographically, three grades of loading, Heavy, Medium and Light, are specified, and it is intended that the administrative authority in each state shall classify its territory as Heavy, Medium or Light loading districts in accordance with a method outlined by the Bureau in Appendix D of the Rules.

The prescribed loading for grade A construction for a heavy loading district is a wind pressure at right angles to the line of 12 pounds per square foot on the projected areas of the poles, and on the areas which the wires would present if covered with one-half inch, radial thickness, of ice. Seven pounds pressure is specified for grade B and four pounds for grade C. In medium loading districts two-thirds of the above pressures are taken and in light loading districts, four-ninths.

The total stresses, calculated on the above basis, must not exceed one-half the ultimate strength of the pole when set nor must the pole be permitted to deteriorate to less than two-thirds of its strength when new. The calculated stresses may, however, equal three-fourths the strength of the new pole if the pole is maintained up to three-fourths of its original strength.

Stress in the Conductor

Conductors are required to be strung in accordance with the sag tables which are made a part of the rules, and longitudinal stresses are then calculated on the assumption of one-

half inch ice and eight pounds wind pressure, at 0° F. for a heavy loading district. Two-thirds of the resultant stress under the above loading is assumed for Medium loading districts and four-ninths for Light loading districts. For grades A and B construction the total stress in the conductor must not exceed 50% of the ultimate strength and for grade C 60%, except that for No. 6 wire and smaller these limits are somewhat exceeded.

In addition to the sag tables, minimum sizes for conductors of different materials and different span lengths are specified, and minimum pin spacings for the various sags are prescribed. I have dwelt at some length on loading, and the requirements for conductors, as it is in these respects that the rules most affect present practice.

Classifications in the State of Washington

Ever since the appearance of Part IV of the Code in 1914 the Hydroelectric and Technical Committee of the Northwest Electric Light and Power Association have taken an active part in its development, both by correspondence and through representation at the more important conferences. When therefore the Public Service Commission of Washington, in the latter part of 1917, announced its intention of calling a conference to discuss the advisability of adopting the National Electrical Safety Code in lieu of the present statutory rules, the committee was asked to prepare a report for the Association, setting forth the effect which the new rules would have on construction methods in Washington. Early in 1918 the committee took up this work.

The state of Washington had been tentatively classified by the Bureau as a Medium loading district on the strength of weather reports from half a dozen stations only. To determine what grades of loading various parts of the state would actually take, the committee set about the collection of weather data from more than one hundred points well distributed over the state. Mr. Chas. F. Marvin, Chief of the Weather Bureau, extended every assistance through the main and co-operative stations of the bureau. In addition, extensive data was obtained from individuals who had made a practice of recording weather conditions in the form of diaries. Actual wind velocities could be obtained only from the main stations of the Weather Bureau, but sleet and temperature records were obtained from all points. Estimated wind velocities from cooperative stations of the Weather Bureau and from private observers are, however, of considerable value as indicating relative conditions.

This data as finally compiled shows, by months, for periods of ten to twenty-five years, maximum wind velocities, minimum temperatures, and all observed occurrences of sleet. It also shows the temperature at time of maximum wind, the wind at time of minimum temperature, and wind and temperature conditions at time of sleet occurrence, together with thickness of sleet.

From this data the grade of loading was worked out for each observation point, following the method used by the Bureau of Standards, as described in Appendix D of the line rules. A map was then prepared showing the grades of loading in colors. The mountainous regions are left uncolored, no data being available. They would probably take a heavy or extra heavy classification. Tatoosh Island, at the entrance of the Straits of Fuca, takes a heavy classification, the wind velocities being the highest in the United States. High wind velocities are also found in the immediate vicinity of North Head at the mouth of the Columbia, but as sleet and low temperatures do not occur, the loading is medium. A narrow strip along the north bank of the Columbia, from the eastern entrance to the Columbia River Gorge near White Salmon, to west of Vancouver where the river turns north, is subject to occasional sleet and takes a medium loading classification. In the other parts of the state, excepting the moun-

tainous regions, sleet is practically unknown. Wind velocities reach 60 miles per hour west of the Cascades in a limited area around Seattle, with temperature minima of 10 degrees above, not however simultaneous with highest wind. East of the Cascades the temperature reaches 20 degrees below, but the wind seldom exceeds 40 miles per hour.

A large part of the state therefore takes a light loading classification, with weather conditions less severe than those obtaining in the San Francisco Bay region, which is classed by the Bureau of Standards as light loading territory.

After an exhaustive study of the new rules with special reference to present construction practice, and the requirements of the Washington statute, the committee were convinced that if the state were redistricted for loading as the committee believes it should be, the new rules would not be more burdensome than the rules of the statute, and at least as great a measure of safety would be secured. In light loading regions practically no changes would be required from present good practice, except in minor details which would entail no appreciable added expense. In medium loading districts the requirements would prove more burdensome, especially in long span suburban construction where greater sags than are commonly used would be required, and consequently greater pin spacing on crossarms to prevent conductors swinging together. The minimum permissible size of conductors, in spans of over 150 feet, would also be increased. In urban construction where short spans are of necessity used, the increased requirements in new construction would probably not prove seriously burdensome as compared with the present rules.

In states where construction regulations are less stringent than in Washington, and in those states where no regulations exist, the cost of line construction under the Code would usually be materially greater in medium and heavy loading territory than under present good practice. In light loading districts it would probably be slightly so.

The Future of the Code

The National Electrical Safety Code is now nearly three years old, and notwithstanding unfavorable conditions, has been adopted in whole or in part by more than forty municipal, state, and federal bodies, either for reference or as a code for regulatory purposes. Upon the completion of the revision of the line rules it will be published in improved form, and may be expected to rapidly become the standard electric construction of the country.

While the 1916 edition was issued "for examination, trial, and constructive criticism," the forthcoming issue is intended for adoption and enforcement, and this will be persistently urged upon administrative bodies by the Bureau. From past experience it may be expected that representatives of the Bureau will visit all parts of the country on this mission, not once, but from time to time until the Code has come into general use.

Nor will the interest of the Bureau stop here. To quote from a recent publication: "The same methods of study and cooperation which were used in originally formulating the National Electric Safety Code will be continued in the endeavor to keep it up to date"; and again, "A federal agency having the general cooperation of state commissions, utility officials, manufacturers, workers, and engineers, can more adequately and reasonably revise the code than can local bodies, and at the same time offer assurance that this necessary revision will be done."

In view of the many excellences of the code, and its compilation having been an accomplishment of no mean order, it is regrettable that, at the start, lower values could not have been chosen for the assumed loadings, and these increased as the need was demonstrated. Since this course has not been followed, it is to be hoped that as the code is revised from time to time the loading values may be reduced, until a wise balance is struck between the cost of construction and the measure of safety secured.

Is the National Electrical Safety Code Suitable for California?

BY EDWARD B. ROSA

(At the recent Coronado convention of the Pacific Coast Section, N. E. L. A., the policies of the Bureau of Standards in regard to the Safety Code, as well as a possible Code of Ethics, were discussed and a resolution in disapproval of this latter step was passed. The Journal of Electricity recorded this action in its May 15th issue and at the same time commented editorially on the situation. The following reply from the chief physicist of the Bureau of Standards clearly states their standpoint in the matter and denies all intention of instituting a Code of Ethics or attempting the regulation of rates. The article should be carefully studied by Western men who are interested in this vital question.—The Editor.)

The May 15 number of the Journal of Electricity contains a report of the Engineering Committee of the Pacific Coast Section of the N. E. L. A. in which some statements are made concerning the National Electrical Safety Code and the Bureau of Standards which do injustice both to the Code and the Bureau. After stating that "it is the opinion of the Engineering Committee that it is of more importance for the Pacific Coast companies to have a practical workable Code simplified and made applicable to conditions with which Pacific Coast engineers are familiar and entirely competent to pass upon, than to attempt to put into effect the Code prepared by the Bureau of Standards," the committee adds: "The fact that the Bureau of Standards attempted to cover the whole of the United States makes its Code necessarily of somewhat remote application to our local necessities."

Revised to Meet Western Conditions

It is well known that the National Electrical

Safety Code has been formulated with especial reference to meeting the varying conditions of climate that prevail in different parts of the country. Three grades of loading are specified for overhead lines, heavy, medium and light, and the requirements of California were kept prominently in view in formulating the Code. The engineers of the Bureau have visited California several times for the purpose of getting information and suggestions in this connection, and engineers of the California utilities have attended conferences on the Code in New York and Chicago and reported their conditions fully. At all times during the past four years the Bureau has welcomed criticism and suggestions from California as well as from other parts of the country, and if the Code is not entirely suited to California conditions or is not entirely satisfactory to California engineers we are anxious to know in what respects it falls short. The engineers of the Bureau have been engaged for more than a year in revising the

Code and have made many improvements in it. It is still possible to make further changes if any others are found necessary to make it thoroughly satisfactory.

In Close Touch with Field

The N. E. L. A. committee on Safety Codes and Accident Prevention, of which Mr. W. C. L. Eglin is chairman, is actively cooperating with the Bureau in the revision of the Code, as are the representatives of the other utilities concerned. These other utilities include the steam and electric railways, the telephone and telegraph companies, the electrical manufacturers, the state commissions and the electrical workers. The Bureau of Standards is doing this and other similar engineering work with the assistance of a very large number of very competent and experienced engineers representing the utilities, and the California committee has an entirely wrong impression of our work if it believes it fair to characterize it as "studies and compilations of a group of scientists who have had no personal connection with the industry."

The National Electrical Safety Code has not been compiled by a group of scientists. Most of the men who have been engaged upon it are engineers, some of them of very considerable practical experience. But apart from any question of the ability or experience of the engineers of the Bureau, the important fact remains that the Code has had the services of a large number of the most experienced and most competent engineers of the country. It has been open to discussion and criticism and the test of experience for two years since the second edition was printed, and it has stood this test remarkably well. Probably no similar Code was ever prepared with greater care and more thorough study, or with more frequent appeals to experience and current practice. The Bureau welcomes suggestion and constructive criticism, and will do anything possible to make the code more useful and more acceptable. What better basis could be found on which all interests could unite and feel confidence in the results?

Why Make a New Code?

The National Electrical Safety Code is being used throughout the country and is gradually becoming the National Standard. It would be a pity to have California set up a standard at variance with the National Standard unless it is really necessary. There are many reasons for having a national code and uniform practice throughout the country, with local differences only where necessary or where something is to be gained by variation from the standard. Confusion and harm result from needless divergence of practice and unnecessary departure from a national standard.

The proposed California Code is not a complete electrical code, but only contains specifications for overhead lines. It does not include generating stations, utilization apparatus, operating rules or underground construction. As much of what it contains is taken from the National Code and the important differences are few in number, it seems a fair question to ask whether the Engineering Committee could not

take the latest revised overhead lines rules of the Bureau, making a few changes if thought necessary, and thereby get all they are seeking without the necessity of setting up a different set of rules which will cause some confusion and trouble even if they are just as good in every particular.

Other Work of the Bureau

The committee refers to some of the work of the Bureau, particularly Standards for Electric Service (Circular 56), Standards for Gas Service (Circular 32), and the National Gas Safety Code (in preparation), and says that it (the committee) has experienced a feeling of concern in respect to the regulation of public utilities. This statement, we believe, is evidence of a total lack of understanding of the character of these publications and the method of their preparation. They were prepared with the full and cordial cooperation of the National Electric Light Association and the Association of Edison Illuminating Companies for the first and of the American Gas Institute for the others, as well as representatives of the state commission. The Bureau has made it a rule not to publish anything of this kind until it has been submitted to the representatives of the utilities and other interests concerned, and generally all points of disagreement or difference of opinion are cleared up before publication. The manuscript of circular 56 was submitted for criticism to a joint committee representing the two above named associations, and later seventy-five copies of the page proof were supplied to this committee and sent by the committee to sub-committees all over the country for study and criticism. All the questions and suggestions and criticisms collected from all these sub-committees were gone over by representatives of the Bureau with the main committee, and the text changed where necessary so as to be satisfactory to all the interests concerned. Probably no such publication was ever issued in which more careful study was given or greater consideration shown to the various interests involved; and the results were so satisfactory that representatives of the N. E. L. A. and the Edison Association have since frequently referred to the method of handling it as a model of how such a publication should be handled.

The study of street lighting, which was to result in a publication similar in form to those named above, was interrupted by the war and has not been resumed. In that study the Bureau had the cooperation of a committee of the N. E. L. A. and the Edison Association, and expected to accomplish results of great value not only to the public but to the utilities themselves. The Gas Safety Code was also interrupted by the war and has not yet been resumed. In that work the Bureau had the assistance of a technical advisory committee representing the Gas Institute and other associations, and also a series of committees in all parts of the country (appointed by the Gas Institute) to review and criticize every section of the code. Every effort has been made in the Bureau's work not only to be fair to the utilities, but to give them every possible opportunity to present their views and experience and to utilize to the full-

est extent their wide knowledge and experience. The work is carried on in the spirit of fair play and co-operation and is producing results of the greatest value. (The report that the Bureau is contemplating a plan of establishing Standards of Public Utility Ethics, is untrue.)

Cooperation Asked

The Bureau is in close touch with many of the commissions and many of the utility companies in all parts of the country. It is a matter of very great regret that because the country is so large and our staff is limited we have not been able to keep in as close touch with California as with nearer states. We have the highest respect for the ability of the engineers of the California utilities and commission and, of course, do not question their knowledge of California conditions and their own operating methods. We do believe, however, that any feeling that may exist to the effect that the National Electrical Safety Code could not be used satisfactorily under California conditions is based on a misunderstanding. The engineers of the Northwest section of the N. E. L. A. representing the utilities of Oregon and Washington, are actively cooperating with the Bureau and expect to see the national code adopted in those states. The support and cooperation the Bureau is receiving throughout the country is more complete and more cordial at the present time than ever before. We believe that, if California will work with us, any differences or difficulties can readily be overcome, and the immense advantage of being in harmony with the rest of the country on this important matter will be realized.

THE HIGH VOLTAGE LABORATORY OF THE FEDERAL TELEGRAPH COMPANY AT PALO ALTO, CALIFORNIA



Corona plumes on end of high voltage electrode. Corona appeared at 240,000 volts. Voltage during exposure, 150,000. Frequency, 50,000 cycles per second.



Testing string of suspension units with corona shield: Showing corona plumes maintained by potential of 150,000 volts at frequency of 48,000 cycles per second. Corona first appeared at 207,000 volts. (Note: The voltage required to sustain high frequency corona is much less than that to start it.) Time of exposure, 10 minutes.



High Voltage Laboratory showing larger inductor wound with special radio frequency cable and mounted between the insulating supports of the undergrounded "plate" of the air condenser. The supports are built up of porcelain blocks and sheets of galvanized iron. This construction was adopted because of its cheapness and strength. Note large radii of curvature of all parts of the undergrounded "plate" of the air condenser and high voltage electrode. This is necessary in order to prevent formation of corona at comparatively low voltage.



Burnside Bridge, as well as the other bridges across the Columbia, formed a spectacular feature of the night illumination

Electrical Festival of Portland's Victory Rose Carnival

BY F. D. WEBER

(The constant emphasis on the utilitarian application of electricity should not make people overlook its possibilities in the field of decoration. The striking effects achieved with electric illumination at the recent Rose Carnival in Portland are fine examples of what can be done along this line. The author is Chief Electrical Engineer with the Oregon Insurance Rating Bureau.—The Editor.)



The metal rose which formed the main feature of the street illumination.

THE Victory Rose Festival was held in Portland, Ore., June 11, 12, 13, 1919, to honor the men of the Service and celebrate victories won the past two years. The Rose Festival is the outgrowth of an idea conceived in 1907, and with two exceptions it has been held annually ever since. In order to properly carry out the Rose theme of this Festival it was decided to construct 250 red, yellow, pink and white

roses of No. 28 sheet metal. A porcelain Mogul socket was mounted in the center equipped with a 1000 watt frosted nitrogen lamp. This equipment served to give the flood lighting of the streets at night and the decorative effect of the rose during the day. The roses were 36 in. in diameter and ventilated to dissipate the heat. The stem was made with a 1/2 in. rubber hose fitted to the base of the Mogul socket and to an 8 ft. wooden stick. This gave flexibility and also served to keep the water out of the sockets. On the stem were mounted 10—6 by 9 in. green metal leaves. These were attached to the wooden stem by iron wire covered with a layer of friction tape to give the proper thickness. The roses were distributed along 50 city blocks and hung 4, 6 or 8 to a city block, according to the length.

Wiring Arrangements

The suspension of the roses over the streets was accomplished by erecting two No. 8 U. S. gage

messenger wires on No. 6 U. S. gage span wires. These were insulated with "goose egg" breakers 6 ft. from the buildings and at trolley crossings. The lights in the roses were fed from 2 wire circuits of No. 8 and No. 10 weatherproof insulated wires, insulated by means of porcelain strain insulators from



The arch at the railway station as it appeared at night

the messenger and span wires. The two wire circuits were balanced over 3 wire feeders attached to the underground and overhead system of the Portland Railway, Light & Power Company's system.

Along both sides of the street garlands of spruce hung from the lamp posts, from which were suspended 4 12-in. flower baskets filled with flowers which had been growing two months in advance. Also large white papier mache urns filled with flowers were distributed along the sidewalks. Interspersed with these decorations were 1000 flags and pennants with 400 large Festival posters.



Three of the electrical floats in the parade.—The Northwestern Electric Company gave away fresh baked cookies, kept hot in the ranges which were heated before the parade. Electric washing machines were featured by the J. C. English Company, and electric appliances and war service by the Portland Railway, Light & Power Company.

All of the bridges across the Willamette River were illuminated for the occasion.

Lamps

Streamers, containing 3000 50-watt carbon "ruby" and 10-watt "clear" mazda lamps were installed, the ruby and clear lamps being alternated.



The float of the Jaggar-Sroufe Company was devoted to the interests of the local U. S. recruiting office and was known as "The Watch on the Rhine."

Also 25 200-watt "Ivanhoe" fixtures using an open ball, acorn shaped, were used to increase the illumination.

On the arch erected at the railway station there were 40 75-watt lamps and one 100-watt lamp.

On the arch at the Festival Center 500 10-watt lamps were used.

The total cost of the electrical decorations was \$15,000, and all of the electrical decorations were designed and installed by the Jaggar-Sroufe Company, electrical contracting engineers, Portland, Ore.

The Victory-Industrial Parade

As the Pacific Coast Convention of the Pacific Coast Advertising Men's Association was held just prior to and during the first day of the Victory Rose Carnival, it was arranged to combine their "Animated Trade Mark" parade with the Victory and Industrial features of the Rose Festival parade. This parade took place June 11th at 2:30 p.m. and was the best and largest parade of its kind ever witnessed on the Pacific Coast. It was divided into three

sections: First, the Victory section, which was an exposition of the patriotism of the individual counties, cities and towns; second, the Animated Trade Mark and Industrial division. The animated trade marks, used by a firm making an entry, were made by using living or mechanical moving objects, figures or devices and were judged for their selling value. Outside Ad Clubs and Chambers of Commerce entered in a separate division, displaying community advertising and enterprise; while in still another class, any industry could enter a float which had merit but did not fall into the animated trade mark class.

The third section was the Civic-Fraternal division. The floats had to depict the ideals and purposes for which the organization stood. Over eighty dif-



Besides the city illumination, many of the stores arranged for special lighting. One of the metal roses may be noted in the center of the street in the foreground.

ferent firms and organizations entered floats in this parade. Eighteen cups, three pennants and a \$100 cash prize were given for the best floats in each class. This parade was in charge of Mr. S. C. Jaggar of the Jaggar-Sroufe Company.

Electrical Floats

Several of the electrical utilities and individual electrical firms appreciated the advertising value of this parade and entered creditable floats.

Contractor-Dealers' Convention at Santa Cruz

(The third quarterly meeting of the California State Association of Electrical Contractors and Dealers at Santa Cruz, June 27-28, was most successful in every point. Important business was at that time transacted and the papers and discussions which developed brought out valuable contributions to the subject of good merchandising and contracting practice. A brief account of this pleasant occasion and some of its results is here given. The excellent work of this organization was recognized in the cup presented by the Journal of Electricity to the section having the best attendance during the coming year. Further details of the contest will be given later.—The Editor.)

The annual meeting of the California Association of Electrical Contractors and Dealers, held at Santa Cruz June 27th and 28th, proved to be one of the most enthusiastic and instructive meetings in the history of the Association. With an attendance of nearly 200, every branch of the industry — contractor-dealers, manufacturers, jobbers and central stations — was well represented. The discussions at the various meetings were productive of an interchange of ideas that will prove most useful to those attending and redound to the future benefit of the entire industry.

The two most important business matters were the decision that clearance sales were inadvisable and that contracting costs should be studied and distributed to members.

Business Meeting

The meetings on Friday were devoted to reports of officers and committees showing results accomplished during the post-war period, and to the election of officers for the ensuing year. At this meeting for members only steps were taken to raise additional funds required for the enlarged activities of the California Electrical Cooperative Campaign, and the by-laws were revised so that hereafter new officers will be elected in June of each year and assume their duties on July 1st. The election of officers and executive committee resulted as follows:

President—C. L. Chamblin.

Secretary-Treasurer—J. W. Redpath.

Executive Committee—T. J. Bennett, San Francisco; R. V. Oyler, Berkeley; Walter Mitick, Oakland; Jas. Woods, Sacramento; W. H. Gribble, Chico; R. Gould, Stockton; T. Osborn, Turlock; H. H. Courtright, Fresno; M. E. Ryan, Redwood City; Walter Cox, Santa Cruz; G. E. Arbogast, Los Angeles; F. J. Somers, San Jose.

Papers and Discussions

The Saturday meetings were devoted to open discussions, participated in by representatives from all branches of the electrical industry, of the various problems vital to the contractors and dealers at this time.

The necessity for contractors and dealers to establish more complete and detailed accounting systems, which would permit of an intelligent analysis of operations and indicate the points of weakness in methods and policies being followed, was clearly brought out.

A complete set of books, following the accounting system recommended by the committee of the National Association of Contractors and Dealers, which was made up after an exhaustive study of the subject and which is readily adapted to both small and large contracting business, was shown and carefully explained.

Retail Merchandising Methods

Hugh Kimball of Oakland read an excellent paper on retail merchandising methods, based on his own experience. This paper will be published in a later issue of the Journal of Electricity and is well worth the careful study of electrical dealers.

The remarks of other electrical dealers from various sections of the state were equally interesting and indicated a careful and intelligent study of the subject.

Service to the Public

It was made apparent that "Service to the public," evidenced by a personal and sincere interest in the satisfactory operation of electrical material sold to customers and courteous treatment on the part of employes, not only converted transient trade into permanent customers but created new business as well.

The personal experiences cited by different ones as to results obtained by various plans for developing their business, and the many new ideas brought out, could not fail to prove valuable to those present and will repay them for the time and expense involved in attendance at this meeting.

NOTES ON THE CONVENTION

Utah Association —

Geo. Randall, manager of the Salt Lake Electrical Supply Company, represented the Utah Association at the convention. He stated that as a result of this meeting he was if possible more enthusiastic than before, over the possibilities of developing the electrical contractors and dealers' business through meetings of this kind, at which the various problems affecting the industry could be freely and frankly discussed in open meeting and an interchange of ideas on better business methods accomplished. The Utah Association is preparing to work along similar lines and it will undoubtedly result in better relations between the electrical industry and the public in that vicinity.

The Banquet —

R. H. Ballard, vice-president of the Southern California Edison Company and newly elected president of the National Electric Light Association, was the principal speaker at the banquet Saturday evening. His talk, given in detail elsewhere in our columns, while on a serious subject, was received with enthusiasm and careful attention.

H. T. Jackson, president of the Sierra & San Francisco Power Company, again proved himself to be an ideal toastmaster.

Sports —

Arthur Rowe of the Garnett Young Company, as chairman of the ladies' Sports and Entertainment

Committee, was exceedingly popular and in great demand.

In the ladies' bowling contest Mrs. Curtiss of San Francisco tied Mrs. Nutt of Lindsay for first prize, but in the play-off Mrs. Nutt proved the victor.

In the croquet tournament Mrs. M. A. DeLew of San Francisco led the field and seemed a sure winner, but Mrs. Clyde Smith of Fresno, with a sud-



Mrs. Anderson of Coalinga and Mrs. Nutt of Lindsay who were the winners of the whist tournament and the ladies' bowling contest respectively. Mrs. Clyde Smith of Fresno who was the winner of the croquet tournament was not to be found at the time this picture was taken.

den burst of speed and skill, came up in the home stretch and overtook her at the wire, carrying off first honors.

Mrs. E. J. Anderson of Coalinga was awarded the prize as the best player in the whist tournament.

In the golf tournament Wm. Gribble, of Chico, won the Contractor-Dealers' cup; R. J. Davis of San Francisco, the Manufacturers' cup, and A. W. Childs of Los Angeles, the Central Station cup.

The Journal of Electricity Cup —

The offer of the Journal of Electricity to donate a cup to be awarded to the local section having the best attendance record at annual meetings was enthusiastically accepted. The rules governing the award of this cup are to be determined by a committee to be appointed by the president and will be announced later.

"HOW I KEEP IN TOUCH WITH COSTS IN CONTRACTING"

BY C. J. NEWBERY

There are several good methods for handling accurate cost keeping accounts, and some system of this kind is most vital to the success of the contractor-dealer.

Many men in the contracting business are satisfied to be good mechanics and let it go at that; they do not strive to be good business men. It is not necessary for a contractor to be an accountant, but it is most important that he should employ a competent bookkeeper to handle his affairs, either by whole or part time, and I would strongly urge those who do not employ a regular bookkeeper to get some

one to come in at some time of the day or evening to keep their transactions in order.

Checking Costs on Construction Work

If a man does not know what it costs him to do business, in other words what his overhead expense is, he is absolutely at sea, and a menace to the trade. Overhead expense must be provided for before you can make any profit. Construction work is somewhat more complicated than the retail business, owing to the uncertainty of the labor element which enters into an estimate, and the keeping of accurate costs of a job is the best and safest and only guide. In my office, we many times in the course of a year compare the costs of jobs of approximately the same size and class, and if we find the cost of one job has exceeded the estimate in any one particular item, we try to remedy it in subsequent jobs which we figure on.

A Simple Book System for Contractors

The Newbery Company have developed a system of cost keeping which we use in all our offices, and which is simple and efficient and does not require an expert bookkeeper to handle, but just accuracy in making entries. We have a Cost Ledger ruled with 8 columns: one for wire; one for conduit and fittings; one for switchboard, switches and receptacles; one for labor; one for merchandise sundries; one for contract expense; one for total cost; and the last one for tools, if any are chargeable to that particular job. An account for every job, little or big, is opened in this ledger and all items pertaining to the cost are posted to the columns where they belong, either from stock slips or bills from jobbers, manufacturers, freighters, etc. The labor and contract expense are posted every week from a voucher made up at the time the payroll is compiled, and which shows small incidental expenses, such as car fare and telephone calls by superintendent or foreman during the week on each job. Money paid for salaries, either drawn on account or in stated weekly amount, is also shown on this voucher and posted to the business ledger from there.

Estimating How the Job is Running

At the end of the month all the columns in the cost ledger are added up and the totals posted to the merchandise, labor, and contract expense accounts in the business ledger. These monthly totals in the cost ledger are then added to the totals showing in the separate columns for the previous month, and entered in red ink, and these figures are added up across the page and entered in red in the total cost column. You can then see at a glance what is the exact cost of the job at that time, and can form a pretty good estimate of how the job is running in comparison with the price.

This system of ours is a complete double entry system, and if there is any inaccuracy in any entry or addition on the cost ledger, it is rectified. It is absolutely essential that a reliable system of cost keeping be installed in every business, and I believe it is a well recognized fact that the concern with the best cost keeping will be the most successful, other things being equal.

A New Message to the Electrical Industry

BY R. H. BALLARD

(The recent convention of the California Association of Electrical Contractors and Dealers at Santa Cruz brought forth many notable and helpful utterances. So stirring was the constructive program outlined by R. H. Ballard, vice-president of the Southern California Edison Company, as the newly elected president of the National Electric Light Association, in his speech on that occasion, that the Journal of Electricity prevailed upon him to visit its offices in San Francisco and speak into the dictaphone, in order that permanent record might be made of these helpful words which thrilled his audience at Santa Cruz.—The Editor.)

The necessity of the times is to go forward and not dwell so much in the past. We have come through a great war, which has left its mark, but as a whole our country is in good condition. The banking power of the United States in 1918 was two and one-half times that of the combined banking power of all the countries engaged in the war in the year 1903. Notwithstanding the many calls for purchase of Liberty bonds, Red Cross donations, and other similar matters, the savings per capita in the country for the year 1918 were \$113 as against \$99 in the year 1914. In addition to these savings there was an investment of \$9.00 per capita in direct war savings, which indicates an increase of 40% in savings by the people of the country—which is about equal to the average increases in living expenses due to high prices. The way to bring down prices is to continue the savings policy, thereby reducing the inflation in money due to the government borrowing, which inflation has largely been the cause of the high prices.

The National Electric Light Association as a whole is fully alive to the "go-forward" idea and will attempt to carry through a big program for the coming year. An amendment to the National constitution permits of much greater activities by geographic sections, and an attempt will be made to organize the country into geographic sections, which may result later in national conventions being in the form of national conferences or congresses with delegates elected from geographic sections.

The National Electric Light Association comes to the Pacific Coast with the election of a Pacific Coast man as president, and now the chairmanship of the most important committee—the Public Policy Committee—comes to Mr. John A. Britton of San Francisco.

Have you tried to find out what the Association can do for you individually in addition to the work it is doing for the industry at large? Have you tried to find out what you can do for the Association? What could you accomplish for the electrical industry as a whole by an expenditure of \$5.00 or \$20.00 per year? Very little. But, with 15,000 or more individual members, paying \$5.00 a year; with 5000 or more firms paying \$20.00 per year or a little bit more, and with the dues from the central stations, the fund as a whole is sufficient to permit the carrying on of some really big constructive work.

In addition to the mere paying of dues, it should not be overlooked that a great deal of time and money is contributed by big men in the country who give of these freely for the benefit of the industry as a whole. Let none of us be provincial. No man,

no contractor, no plant, no company, and no central station can singly do very much, but collectively much can be done.

There is much talk going on in the country now by seers and others who are preaching radical changes in government. What is the matter with our present government? Our constitution gives us inalienable, inviolable rights of personal security, personal liberty and private property. To change it, as advocated by some, would be to disregard these splendid privileges, no matter how pure a theory some forms of government, such as Socialism, may be based upon. History has taught us that the administration of these is not American in the fact that the principles of our constitution are disregarded. The Bolsheviks of Russia and the I. W. W.'s of America are one and the same thing—all disregarding rights of property, personal security and personal liberty. To what lengths they have gone in Russia in the disregard of personal security and liberty is well known. There is nothing American in this. The American people do not need a new form of government, but rather they do need to awake to the true signs of the times—namely, the call to service in the highest sense of the word.

Service is not merely a question in the electrical business of maintaining steady voltage and continuous supply; it involves real honesty of purpose, willingness and determination to serve—it includes that indefinable something which makes it a pleasure for a customer to do business with the seller. It should include real, honest, down-in-the-heart cooperative effort, all through the organization.

It is well for contractor-dealers to remember, in dealing with customers, that this same ideal of cooperative helpfulness can be made to pervade every act, to enter into every conversation, so that the public at large may be informed concerning the real motives that underlie the work of this great industry of ours, and thus by this combined effort we may usher in an even more efficient era of prosperity, and usefulness of the electrical industry to the nation at large.

There will be other articles of importance besides those on electricity in farming in the August 1st issue. For instance:—

The Demands of Electrical Inspection—by E. F. Hensler

Concrete Ships—by J. W. Sadler

Acquiring a Water Power Right—by W. B. Heroy

A World's Record in Fuel Oil Conservation—by

E. A. Weymouth

Ideas of Store Merchandising

Should You Mention the Price?

BY ROBERT FALCONER

(Convincing your prospect of the value of your goods before prejudicing him by stating the price is the keynote of this discussion of selling methods. The art of salesmanship is variously interpreted, but the order of procedure is generally recognized as being of primary importance. This is one way of proceeding—what do you do about stating prices to customers?—The Editor.)

Wrong End To —

A mistake that a great many salesmen, and advertising men as well for that matter, make, is to go about selling wrong end to. Instead of working up to the price, they start with the price and work backwards. Possibly this custom has become more common in the public utility business than in any other. A good way to keep in mind the logical steps of making a sale is to remember that when an army officer gives the order to march he does so in the following manner:

Attention!
Company!!
Forward!!!
March!!!!

First, the attention of every man in the company is attracted by calling "Attention!" Second, the interest of every man in the company is aroused by the next word—"Company!!"—which indicates that what follows is something to which every man will have to give close attention. Third, the word "Forward!!!" creates in the men a desire for a definite action. Fourth, the command, "March!!!!" sets the whole company in motion and the sale is completed. This appears to be the only order of giving the command that makes it possible to reduce it to four words and to the shortest possible time. It also follows in logical order the steps which experienced, successful salesmen always take, whether they are aware of it or not.

Applying Army Orders to Sales —

The salesman who will keep these four words in mind in the order in which they appear above and will apply them in principle to his interviews will make more sales and make them in a shorter space of time than will the salesman who does not follow as logical a course in making a sale.

It may make the idea a little clearer to translate the army officer's command into the barest outline of an electric flat iron sale. Following every step closely, we get something like this:

Mrs. Brown!
Ironing convenience!!
Blank Electric Iron!!!
\$6.00, Please!!!!

When the officer calls "Attention!" he uses a word which makes every man give the same sort of attention that they would give if each had been called individually by name. It is always well when making a sale to call the prospect by name if it is possible to learn the name in advance. When we say ironing convenience we arouse an interest somewhat akin to that aroused in the soldiers by the word, "Company!!" When we name the make of the iron we are becoming more specific and creating a desire for a definite article, just as the officer creates a desire for definite action by the word "Forward!!!"

When we collect the money we complete the sale, just as the officer sets the whole company in motion by the command — "March!!!!"

Customers as Raw Recruits —

Of course, no sale can be made as easily as this. This outline, however, does show in a concise manner the different steps of making a sale. It does bring out the fact that something should be said or done before the price is quoted. If the officer should say, "March forward, company," he would not secure the results that he does secure. If, when attempting to sell an electric iron the salesman says, "This Blank Electric Iron makes ironing convenient," he is not going to secure the same results that he will if he says something like this:

People are coming more and more to demand that ironing be made more easy, quick and convenient. To meet this demand the Blank Electric Manufacturing Company has perfected this electric flat iron which is designed to meet every requirement of the housewife, which hundreds of users have found to meet every requirement, and which in every case has saved a great deal of the labor connected with ironing. It sells for only \$6.00.

A salesman or an advertising man may be compared to an officer and the public to whom he is trying to sell to an army of raw recruits. If this army were well trained all that would be necessary would be to give the order about electric irons and a sale would be made. As it is not well trained, each step of the order will have to be explained in detail, just as each step of a command must be explained to new recruits. It is in this preliminary training that the advertising man can do his best work, and it is because advertising is only preliminary training that in so much advertising today we do not see the prices mentioned.

The Function of the Advertising Department —

The work which the well organized advertising department working behind the lines of the sales force does is to attract the attention of the public to the goods sold, to arouse an interest in the demands that are met by these goods, and possibly to create a desire for the goods sold. In most cases it is left to the salesman on the fighting line to actually make the sales just as it is left to the infantry to actually take objectives in warfare.

It is for this reason that the greatest art in selling demands that the selling price be given, as a general rule, a far more prominent place in the advertising matter. The only exception to this rule is where the merchandise is staple, the kind that people are buying daily, the kind the uses and quality of which are entirely familiar to the people, and which is being sold at a price below the current price—below the price which the people know is current. Even then it is usually necessary to show

the public that the goods are really worth more than they are being sold for.

Value and Price —

It is upon those seven words, "worth more than they are sold for," that successful salesmanship hinges. Unless a person is convinced that he is getting at least his money's worth he is not going to spend that money. If he is told the price first and the quality afterwards he may have formed his conclusions before there has been an opportunity to convince him that the articles or the goods are worth

as much or more than the price for which they are sold.

Good salesmanship depends upon selling the prospect the idea of what the goods to be sold will do for him. After this idea has been sold the price is a secondary consideration.

It will be well for every salesman never to say "March!!!!" until he has first taken his prospect through the steps of "Attention!"—"Company!!"—"Forward!!!" Use the selling price for closing the sale rather than for arousing interest or creating a desire.

Audible Electric Signals in Industrial Plants

BY V. KARAPETOFF

(Much time is wasted in industrial plants by the officials, experts, and important employees trying to locate each other. The telephone system has obvious limitations, and for this reason there has arisen a device for acoustic code signals. The device and its various applications is described in the following article, which formed part of a paper recently presented before the Rochester, N. Y., Section of the American Institute of Electrical Engineers. The author is Professor of Electrical Engineering at Cornell University.—The Editor.)

The Need for Acoustic Signals —

No industrial plant of any magnitude may be considered fully efficient unless means are provided for promptly locating any important employe, no matter where he may be within the plant. A private telephone system, however extensive, serves this purpose only so long as the needed man is at his desk, but as soon as he leaves his desk the problem of locating him becomes a hit-and-miss proposition. On the other hand a superintendent, a foreman, a millwright, a repair man, etc., is ordinarily useful only

which carries over a considerable distance. The device is provided with a projector or horn the shape of which depends on whether it is desired to scatter the sound, to intensify it in horizontal direction, or to deflect it downward. Such motor driven signals are now made much more powerful than automobile horns, and are wound for 110 or 220 volts, direct or alternating current, so that they can be connected to a lighting or power circuit, and do not require a separate low-voltage battery.

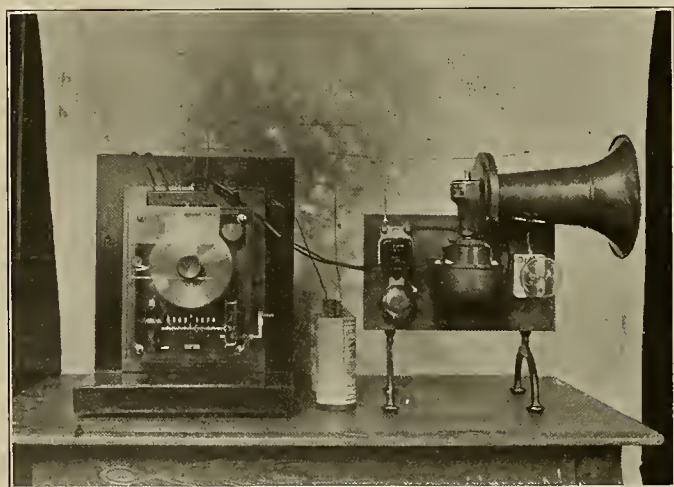
With such electric audible signals scattered throughout the plant, it becomes an easy matter to locate instantly any person to whom a code number has been assigned. For example, when the manager wishes to speak to one of the assistant superintendents, who may be anywhere in the plant, he simply tells the telephone operator to sound this particular man's call. As soon as this assistant superintendent hears his call, he comes to the nearest telephone and reports, whereupon the operator connects him with the manager.

It would be rather inconvenient for the telephone operator to sound the various calls by hand; therefore a special code-calling automatic instrument has been developed for this purpose. The operator merely sets the desired person's code number on a dial and pulls a lever. A contact-making mechanism is thereby set in motion, which closes the electric circuit and operates the code signals throughout the plant the required number of times and then stops automatically.

In noisy and in open places, or in large factory lofts, the electric horns mentioned above constitute the most suitable type of signal. In offices they may be replaced by less loud electric gongs, bells, buzzers, air whistles, or incandescent lamps.

Various Industrial Uses —

Of all types of industrial plants, steel mills have buildings scattered over a particularly large area, with wide yards between. Taking into consideration also the noisy character of such mills, the importance of acoustic signals will at once become apparent.



A code calling instrument (Klaxocator), and the signals which it actuates, viz., an electric horn, a bell and an electric lamp.

in so far as he can freely move about the shop without the fear that someone of importance may need him. Thus, within the last few years, audible electric signals have been introduced into many industrial plants.

Such an electric signal is usually similar in its construction to the familiar electric "horn" used on automobiles. It consists of a diaphragm with an anvil at its center. A toothed wheel driven by a small electric motor strikes the anvil many times a second and causes it to vibrate vigorously. These vibrations produce the well-known warning tone,

The large capital involved in the production of steel, the necessity for high-priced experts and for a very rigid organization,—all these factors make the installation of an efficient code calling system almost imperative; the trifling expense involved is insignificant in comparison with the results.

Ship yards resemble steel mills in so far as the needs for acoustic signals are concerned, with the added problem of inconvenience of direct communication between two parts of a ship hull or between two ships under construction.

In a textile mill audible signals are essential on account of the deafening noise of hundreds of high speed machines and spindles used in many departments. Since telephones are practically impossible in such noisy shops, and since the code system is here needed only for a comparatively small number of superintendents and engineers, each person should be given two or three code numbers, in order that he may know where to go, and what to do.

The character of work in a large printing establishment is such that the production manager, the man in charge of the machinery, and a few other experts have to cover several floors. A code calling system is therefore an essential adjunct in such a plant, and the signals employed vary from powerful electric horns in noisy press rooms down to gentle buzzers in the offices.

A modern coal mine may have miles of passages and rooms underground, so that the superintendent, his assistants, the master mechanic, the electrician, etc., have to cover quite an extensive area. In some states the law prescribes mine 'phones at the main workings and this requirement makes a code calling equipment so much more important. The superintendent may be half a mile away from the nearest telephone, with no possible chance of hearing it or knowing whether he or someone else is wanted. A system of powerful horns installed throughout the mine and connected to a code-calling instrument outside the mine would instantly convey the call.

A further improvement of this system might consist in providing the superintendent, the foreman, the electrician, etc., with portable telephones, which could be connected to the line wires at any point.

Audible signals could be made useful on large construction jobs, scattered over a considerable distance; for example, on large buildings, hydraulic dams, power plants, bridges, aqueducts, transmission lines and the like. Such audible signals may be used either in conjunction with temporary telephones, or without them.

Marine Applications —

The hazards of the sea today demand an equipment which will not only fill the needs of routine service, but which will also prove unfailingly efficient under the stress of emergency. The intercommunication and signal equipment is the nerve system of the ship. During emergencies it becomes the one and only means which enables the officers to direct and coordinate the operations of the ship and its crew. A large number of electric horns have been recently installed on various United States naval vessels.

Western Ideas

EFFECTIVE EMPHASIS is often achieved by featuring a single appliance. A San Jose company recently focused attention on their portable electric lamp by devoting to it their entire window. On a table covered with gold-brocaded cloth were a half-dozen electric lamps with gold bases and shades. Others were placed on the floor or clamped to the wall or the glass. A large red card with white lettering bore the following announcement:

"THE LAMP OF A THOUSAND POSITIONS

"You can hang it, stick it, clamp it, or stand it. There's a soft mellow light just where you want it."

A black background and green floor-covering set off the bright display.

A window which exhibits an indiscriminate assortment of merchandise leaves no particular impression on the preoccupied mind of the average pedestrian, even if he stops to look. A window which has a scheme with broad and obvious outlines, or one which devotes its entire space to the presentation of one particular appliance, will carry a definite message which the passer-by can take in at a glance and carry away with him.



DENVER ILLUMINATION

The effective illumination of the headquarters building of the Denver Gas & Electric Company is an example of the fact that the electric decoration of a building need not be confined to strings of lights in outline. The pattern effect of the light groupings in this case is most artistic—and suggests a field of experiment along similar lines.

Customers' Comments

(The mystery of a woman's thoughts is here unraveled by a woman herself, who here gives her impressions of a recent shopping expedition. Was one of these your store? — The Editor.)

SHOPPING is a high art but salesmanship is more so. The salesman's most common complaint against the customer is that she (I have yet to see a criticism of the man shopper!) does not know what she wants. The customer's frequent objection to the salesman is that he knows too well what he wants to sell her.

IN SEARCH OF WASHING MACHINES I braved the terrors of the opinionated salesman in the serene confidence that this time, at least, I knew exactly what I wanted. Before the end of my wanderings, however, I learned that there are as many varieties of the last-word-in-washing-machines as there are in hat-trimmings, for instance, and I discovered that my formerly unbiased mind was being influenced not by the virtues of the washing machines but by the people and the places selling them.,

THE NONDESCRIPT STORE is almost enough to discount the effect of a good salesman. The first place I came to was fairly attractive on the outside, but on entering the door I was aware of nothing but a perfect forest of price tags. They dangled by ten-inch strings from a solid canopy of chandeliers; they trailed conspicuously from toasters and electric irons; they balanced themselves precariously on small boxes. I had an absurd desire to read them all, without the slightest curiosity concerning the articles to which they were attached; and from that brief impression I cannot recall the quality or features of a single article: nothing but price tags.

OUT OF THE GLOOM a corpulent gentleman in his shirt sleeves bore down upon me, and hearing that I wanted to look at washing machines seemed to lose interest. He turned on his heel, and indicating me with a jerk of his thumb over his shoulder, said to some unseen minion in the background, "Show lady washing machine." This telegraphic admonition produced a pleasant, quiet-mannered young man who led me down the long narrow store into a pitchy darkness, where I feared every moment to fall over something. He switched on a light and disclosed a lonely washing machine which he proceeded to explain very pleasantly and effectively, demonstrating the wringer by passing a large handkerchief through it. But this one act eventually caused his downfall as far as I was concerned, for after about four minutes he did it again and I realized with a shock that he had a revolving speech, and that through my staying a little too long we had come round to the same point again. But for the handkerchief incident I might not have noticed it. However, he was really a pleasing salesman and if they had had more than one washing machine in the store my search might have ended there. Even if it is only a question of washing machines, we like to feel that we are exercising our judgment and our privilege of selection.

A GOOD WINDOW DISPLAY was the next thing which caught my eye. It had nothing to do

with washing machines—but I went into the store. A most sociable atmosphere pervaded the place. There were a number of people leaning on the counters having friendly talks. They were talking about Los Angeles. Nobody seemed to be buying or selling anything. I had the rather disconcerting sensation of having entered a club of which I was not a member, and stood somewhat irresolutely by the door, loath to interrupt. Finally an agreeable but somewhat untidy lady emerged from the conversation, approached me, and silently cocked an interrogative eye. I said faintly, "Washing machines," whereupon she became suddenly and unexpectedly businesslike. She led the way to the back of the store (all washing machines seem to be in the back of the store), took up her stand beside one of two machines, drew a very deep breath and began. She recited in a loud monotone what she herself called the "talking points" of this particular machine. Derailed by my occasional questions, she would lapse into a gratifying informality, but just as I was on the verge of learning some of the irrelevant things it pleased me to know, she would resume the recitation at the exact point where I had interrupted it.

THE STORE WAS VERY NOISY—a fact which perhaps accounted for the loud tones in which the lady seemed disposed to address me. People were coming and going, shouting queries up a flight of stairs, banging doors and dropping things. They had good washing machines there, but I felt suddenly exhausted.

A STORE WHICH "USED TO KEEP THEM" was my next experience, and I came out with the feeling that washing machines were quite out of date, and no longer used in the best families.

A HUMAN OASIS in a desert of "salesmen" was a friendly middle-aged man who made no particular, or at least no obvious, effort to sell me a washing machine. He confined himself chiefly to answering my questions in a pleasing and informal manner, adding little suggestions of his own and an occasional apt story of some humorous experience with other customers.

His washing machines were a great deal too expensive for me, but he seemed to bear me no ill will on that account. We parted on the best of terms, and I felt as though I had done him a favor by taking up his time for nothing—though of course he may have sworn as soon as I was out of hearing.

A VERY PLEASING STORE was the next scene of my activities, but its effect was much marred by a well-dressed young Adonis whose abstracted and perfunctory attention gave me the impression that he had an absorbing five o'clock engagement and was planning just where he would take her to dinner. He was irreproachably polite, but very detached. I had to work hard for any information I wanted, and he seemed distinctly relieved when I withdrew and left him to his absorption.

When I find an inexpensive washing machine, an attractive store, and a human salesman all miraculously gathered together under one roof I expect to dismiss the laundress.

The Engineer—His Opportunities and Responsibilities

BY JOHN B. FISKEN

(The engineer is becoming a more and more important factor in the modern world, but his unnecessarily retiring temperament tends to prevent him from taking the high place which is rightfully his. The qualifications necessary for a successful engineer, some of the vast opportunities of service which lie before him, and the responsibilities which are inseparable from his calling are the lessons which this article aims to bring home.—The Editor.)

You will notice from the title which I have chosen for this paper, that I have assumed that engineers are of the male persuasion. I believe my assumption is correct today, but what of tomorrow? Is there any good reason why women should not enter our profession? We all know they have been successful as lawyers, doctors and ministers, and while I have never known of a female engineer, I believe the field in our country is one which in time is sure to be invaded by women and, I predict, successfully.

To justify my predictions I would point to the fact that in Britain prior to the signing of the armistice, women were being trained to fill technical positions. During the war women played an increasing part in electrical industry, a fact which has been noted from time to time in the trade and technical journals. Whether they are to retain their hold on such work or not remains to be seen. Where only brains are necessary, there is no doubt that women can "hold down the job," but in cases where muscular strength is necessary it is probable that men will have it all their own way.

What Is an Engineer? —

The question may be asked, What is an "engineer?" and it may be well to consider that question, and with it the question, What is engineering?

I do not think we can possibly find a better definition of engineering than that given by the late Henry Gordon Stott, a Past President of the American Institute of Electrical Engineers. He defined engineering as "The art of organizing and directing men, and of controlling the forces and materials of nature for the benefit of the human race," and that definition is one we should constantly bear in mind.

The Qualifications for an Engineer —

About three years ago the American Society of Civil Engineers' committee on engineering education sent out a questionnaire on the subject to a large number of practicing engineers throughout the country, and about fifteen hundred answered. A compilation of these answers gave the following somewhat startling results:

1. Character, including integrity, responsibility, resourcefulness, initiative	41.0
2. Judgment, including common sense, scientific attitude, perspective	17.5
3. Efficiency, including thoroughness, accuracy, industry	14.5
4. Understanding of men, executive ability.....	14.0
	87.0
5. Knowledge of the fundamentals of engineering science	7.0
6. Technique of practice and of business.....	6.0
	100.0

To sum up, the principal factors which contribute to a successful career either as an engineer or a business man, according to the tabulation of the American Society of Civil Engineers' committee, are

character, judgment, efficiency and understanding of men; add to that technical knowledge and you are supposed to have a completed whole. All of that cannot be acquired in a four years' college course, and to my mind more is necessary. An engineer to take his proper place as a citizen should have confidence in himself as a public speaker, and to acquire this confidence he should take advantage of every opportunity, both in his college years and those that immediately follow. It is not necessary that he should make a long speech, but the accomplishment of being able to rise and address a meeting, if it be no more than asking a question, is one that is not sufficiently possessed by the majority of engineers.

A man to successfully fill a managerial position which may involve questions of franchises must have a thorough knowledge of municipal government organization; he must be able to foresee the outcome of any investment he may be called upon to make; he must be able to understand fully all financial statements submitted for his approval; he must know how and when to finance new projects; and he must be able to set a price on what he has to sell that will enable him to earn a fair profit. To do all this involves a knowledge of economics, accounting, banking, commercialism, and the principles of common law. In addition, a command of foreign languages should be extremely helpful to the man who desires to take advantage of the great international opportunities which are ahead of us.

The Engineer's Opportunities —

Having discussed the composition of the engineer, we may ask what are his opportunities?

Early in 1917 the authorities of Purdue University published the results of an analysis of the activities of the alumni of the School of Electrical Engineering. They took the period of ten years ending June, 1915, during which period 705 students had graduated, and showed the number and percentage engaged in various lines of work, as follows:

		%
Manufacturing	250	35.4
Operating Railway	138	19.6
Telephone and Telegraph.....	46	6.5
Public	16	2.2
Teaching	43	6.1
Non-electrical Engineering	32	4.5
Non-engineering	58	8.2
Miscellaneous engineering	71	10.0
Unaccounted for	28	3.9
Deceased	23	3.2
	705	99.6

Commenting upon these figures, Professor C. Francis Harding, head of the School of Electrical Engineering, said "that during the last few years there has seemed to be a greater tendency for electrical engineers to enter situations of a more or less commercial nature with the utilities and other positions requiring a broader training than was the case

ten years ago." There is no doubt in my mind that Professor Harding is correct, and I believe that a similar analysis of other branches of engineering would show a similar result.

Many students expect when they graduate that they will find positions open to them at large salaries, but unfortunately very rarely is this the case. Few engineers attain to a large degree of usefulness under the age of thirty, and I believe that in the case of quite a large majority the age is considerably in excess of that.

Economic necessity, largely the outcome of competition, has resulted in the consolidation of manufacturing and public utility interests. This has necessitated the creation of departments offering an opportunity to the man who has demonstrated his capability to become a department head. There is some danger that the engineer heading a department may become so wrapped up in his attempts to increase the efficiency of his own department or specially that his development becomes dwarfed, and to avoid this he must, so far as lies in his power, keep in touch with the developments of other departments.

There are many opportunities for the engineer to "go it alone" as a consulting engineer, though here also there is some risk of attaining too high a degree of specialization. The opportunities of the consulting engineer have, however, greatly lessened within the last twenty years. This is due to the increased standardization of apparatus. Formerly a person or corporation not having an engineer regularly employed and desiring to have some engineering work done, engaged for the purpose the services of a consulting engineer, who prepared plans and specifications; but now the manufacturers of machinery will to a large extent furnish all plans and specifications necessary, and all that is left to the consulting engineer is to act as inspector or superintendent of construction.

There are still many opportunities for the consulting engineer to achieve financial success in investigating new engineering projects preliminary to the preparation of plans and specifications, in specializing as an efficiency expert, and in looking after a client's interests before utility commissions or other regulatory bodies. The administrative functions of a city government are largely questions of engineering, with such exceptions as financial, police and possibly fire protection, though that should be classed as an engineering problem.

The Engineer Is Too Retiring —

It has only been within the last decade that the antiquated saying that "competition is the life of trade" has received its death blow in so far as public utilities are concerned, and the modern idea of commission regulation has been accepted. There is no more reason why a city should have, say, two electric light companies, two telephone companies, or two street railroads, than there is why a dog should have two tails. The public utilities commissions as they exist in most states today have the power to regulate both rates and service, and the burden is placed upon them of making rates that are fair both to the public and to the stockholders of the utility. To do

this properly involves an extensive knowledge of engineering, but in too many cases the personnel of the commissions is made up of politicians with engineers conspicuous by their absence. The engineers largely have themselves to blame for that condition, and in connection with this subject I would like to quote from an address by the late President Stott of the A. I. E. E.:

"Whilst the legitimate field of work of the engineer is extremely broad and almost unlimited, yet as a rule he has apparently decided to keep in the background and only come to the front when called. The result of this policy is that when the opportunity comes, the engineer is taken at his own valuation and passed over for others, who, whilst not suffering from modesty, are lacking in engineering education and experience, and therefore are forced to call in engineers (to act in a subordinate position) to supply the incumbent's deficiency in the qualifications necessary for the office.

"A good illustration of this policy is furnished in the appointments made on two state public service commissions, in which the ten offices are filled by gentlemen whose occupations had been as follows: six lawyers, two manufacturers, one political office-holder, and one engineer. These commissioners have control of all matters pertaining to public service corporations; and as their functions are of an inquisitorial and critical nature, it is quite evident that their lack of engineering knowledge must be a severe handicap, not only to them but much more so to the state that employs them, and lastly, but not least, to the company or corporation suffering from their well-meant but misdirected efforts.

"What is the cause of this anomalous situation? Is it entirely the fault of the executive who makes these appointments? Has not the whole body of engineers some share in the blame? We have seen that there is today an inherent tendency to specialization in engineering, and that by far the greater number of our members are becoming experts in one or two subjects only, and that comparatively few attempt to keep in touch with the more general aspects of engineering. This condition is caused not so much by lack of willingness as by lack of time and opportunity."

I have touched on some of the opportunities which are open to the engineers, but these are by no means all; there are many openings in trade and commerce where an engineering knowledge and training has a distinct value.

The Engineer's Responsibilities —

Let us now consider some of the duties of the engineer; they are so many that we can only give a cursory glance at some of them.

I have already spoken of the advantages to the engineer of taking an interest in civic affairs, and would now state that it is the duty of every man to do this, be he an engineer or a dry goods clerk. In fulfilling this obligation he is not only performing a duty as a citizen, but he owes it to his profession. It is through the medium of the daily press that public opinion can be moulded and the engineer must look to the press for cooperation and assistance.

It is his duty to see that the public is protected from misinformation in the daily press. Too often wild cat schemes are advanced through the newspapers—at times by engineers who are no credit to the profession—and it should be our duty when opportunity offers to discuss the proposed scheme, to point out its fallacy and absurdities.

The industrial relations between man and man and between labor and capital can best be solved by men with engineering qualifications and training. The lawyers and politicians have signally failed in arriving at any solution of the problem, and the conditions which now exist will tax even the ability of the engineers. The war was to a large extent an engineering problem of vast extent and the advantage gained by the engineers through the press reports of their achievements must not be lost.

The engineer owes a duty to his fellow engineer, and to fulfill this duty must guard his reputation. The estimate which the public will place on an engineer is that established by the members of his own

profession. He must at all times maintain a high ethical standard.

The Engineering Societies —

I have left to the last the discussion of the duty which the engineer owes to the Engineering Societies. These societies are composed and always have been of the best engineering talent in the country. This talent has been placed at the service of the profession through the societies. Through them the engineers can exchange ideas by means of papers and discussions, and no engineer can afford to remain outside.

In addition to owing a duty to the national societies, the engineer owes one to the local section, if there be one, in the territory in which he resides, and he owes it to himself to give the section his active support.

There are many benefits to be derived by the individual from such an affiliation and the usefulness of the section to the community is thereby greatly increased. It is safe to say that every engineer has much to gain by coming in contact with other engineers, whether belonging to the same branch of the profession or not. In the past, the standing of the engineer in civic and municipal affairs has been a negligible if not a minus quantity; that situation can and must be changed by the affiliation of all engineers, so that we may look forward to the day when the engineer will rank in the eyes of his fellow citizens at least as high as a hod carrier.

POST-GRADUATE TRAINING WITH A LARGE COMPANY

BY A. C. FORNEY

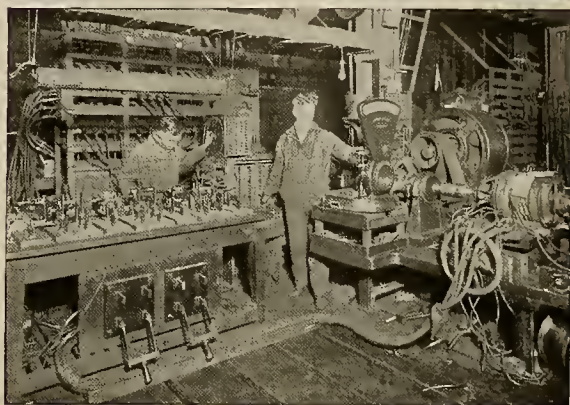
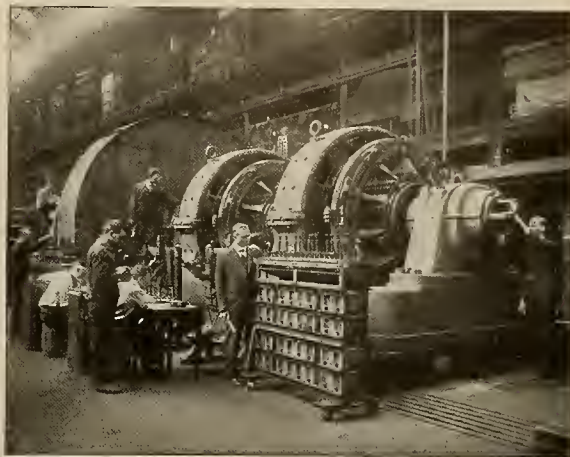
(The training of college graduates for definite positions by an industrial organization is a plan which has been adopted by several large electrical concerns with very satisfactory results. Careful selection and deliberate education of one's own employees, and subsequent "promotion from the ranks," is now preferred to the older method of importing ready-made leaders. Here is an account of how The Westinghouse Electric & Manufacturing Company selects and trains men for responsible positions in its organization.—The Editor.)

The complete success of the army system of training technical men for positions requiring a high degree of specialization has attracted much attention. However, the methods used are not altogether new, as many of them have been used for a number of years by the Westinghouse Electric & Manufacturing Company in training college graduates for its commercial and engineering departments. Briefly, the principles involved are the careful selection of well qualified men for definite positions and the training by intensive methods for such predetermined positions.

Emphasis is laid on the selection of men with the proper characteristics for the line of work they desire. Indication of these qualities is found in the college work and other miscellaneous activities of the technical graduate. Specific intensive training is given for commercial, design, manufacturing and application engineering. The student is segregated for some particular branch as soon as he demonstrates

his fitness and expresses a desire for this particular work.

The course covers a period of approximately twelve months, divided into shop experience and intensive study.



The students have the advantage of shop experience under factory conditions—with proper supervision as well as intensive study to fit them for the particular position they are to fill.

This shop training is followed by a short period of full time intensive study adapting the student to his particular permanent work. This is conducted under the immediate supervision of the department heads.

After completion of the intensive study period the student is taken into the regular organization of the company in the department for which his entire training has been shaped to prepare him. The departmental requirements are known some time in advance and the number of men appointed to the course is carefully restricted to limits based on these requirements. The method of training more men than are needed has been found unsatisfactory. Every man now appointed to the course is selected and trained for some definite position. Quite a number are taken for training as managing operators for public utility corporations.

The preparation of these young men for positions of responsibility is a matter of vital importance to the company, dealing as it does with the man-material for the future operation of the organization. The eminently successful system of "promotion from the ranks" to the higher positions makes it doubly important that the company and the young engineer each recognize the potentialities of the other.



J. E. WOODBRIDGE, chairman of Electrification Committee, chief engineer, Sierra & San Francisco Power Company. Mr. Woodbridge served as chairman of the engineering committee of the Pacific Coast Section N. E. L. A. during the war period and is recognized as one of our ablest engineers in hydroelectric and steam electric generation and design.



F. G. BAUM, vice-chairman of Electrification Committee, consulting engineer. In the design and erection of hydroelectric power plants operating under high head and in the erection of massive storage reservoirs, it is doubtful if a higher authority can be found than Mr. Baum, whose activities are well known both in North and South America.



C. L. CORY, professor of electrical engineering, University of California. In the professional world, Dean Cory's activities have long been a helpful factor. His advice has been sought in many valuation problems throughout the West and his twenty-five years of service at the University of California have placed him among our foremost engineers.



D. M. FOLSOM, assistant general manager, General Petroleum Company, and formerly Pacific Coast Federal Fuel Oil Administrator. During the war period, Mr. Folsom was author of an authoritative report on Petroleum Production and his advice and consultation is of great value in the work of the present investigation.

Scope of Railway Electrification Investigation in the West

(Here is a committee of the San Francisco Section of the American Institute of Electrical Engineers, composed of some of the most distinguished engineers of the nation in the respective lines of engineering thought they represent. The problem attacked is that of railway electrification, a problem of vast importance to the economic welfare of the nation. Much excellent preliminary data has already been collected by these men and it is believed that the conclusions drawn from this research investigation will have a far-reaching effect both in setting new standards of endeavor for scientific and engineering bodies and at the same time in giving to the public reliable and unbiased information of great timely importance.—The Editor.)

Editor's Note.—The pictures of the following important members of the committee were unavailable, but their names should be added to those here given:

R. Beeuwkes, electrical engineer in charge of electrification, Chicago, Milwaukee and Puget Sound Railway.

F. H. Fowler, hydro-electrical engineer, Forest Service.

J. P. Jollyman, in charge electric construction, Pacific Gas & Electric Company.

D. I. Cone, electrical engineer, Pacific Telephone & Telegraph Company, serves as substitute for A. H. Griswold and is at present secretary of the committee.

RAILWAY ELECTRIFICATION

The Committee on Scope and Program makes the following report to the San Francisco Section, A. I. E. E.:

Gentlemen:

Your committee on "Scope and Program" desires to report that in its opinion the general scope of the work to be undertaken in this investigation is to consider the question of railway electrification from the viewpoint of gathering

reliable data and drawing definite conclusions such that the public may be the better enlightened on the question of railway electrification in general, its economics, advantages and disadvantages, and its peculiar relationship to the march of progress.

That these ends may be accomplished with the greatest facility, we suggest the division of the work into sub-committee groupings as follows:

General Composition of Sub-Committees.

1. Scope and Program — Sibley, Ch., Cory, Baum.

To suggest from time to time the subjects to be investigated and the order and method of procedure and to suggest methods of financing the present investigation should same prove necessary.

2. Water Power — Fowler, Ch., Sibley.

To collect and tabulate data on water power existent in California, Nevada, Arizona and Southern Oregon, developed



P. M. DOWNING, chief engineer hydroelectric generation, Pacific Gas & Electric Company, and chairman engineering committee Pacific Coast Section, N. E. L. A. The most helpful and intimate cooperation is being effected between the Institute committee and the Pacific Coast Section, N. E. L. A. Mr. Downing, himself one of our most widely known operating engineers, adds also a strong personal factor in his presence on the committee.



ROBERT SIBLEY, editor Journal of Electricity, formerly professor of mechanical engineering, University of California, and electrical engineering, University of Montana, and author of the resolution bringing into existence the present investigation. Mr. Sibley's wide acquaintance throughout the West in his editorial capacity, will add still another angle in forwarding the work of the Committee's investigation.



J. C. CLARK, associate professor of electrical engineering, Stanford University, and chairman of the San Francisco Section, A. I. E. E. Due to Mr. Clark's enthusiasm and energy much of the early work of the investigation was initiated and this same energy and enthusiasm are to be expected in future work. Mr. Clark serves as an alternate for Prof. Ryan on the committee and brings with him a similar background of constructive work.



A. H. GRISWOLD, formerly Lieutenant-Colonel of Engineers, in entire charge of communications for American and allied forces back of the trenches. Colonel Griswold has an enviable reputation in the West in telephone construction and installation and his thought will prove invaluable in cases where telephone interference is to be considered. His experience in the Inductive Interference investigations will prove of utmost value to the work.



W. J. DAVIS, Pacific Coast Engineer, General Electric Company. Mr. Davis' field of engineering activity is unusually broad. His work in steam power plant design and economy is especially recognized as of unusually high attainment. As one of the two representatives of large electrical manufacturers, his advice will prove of great value.



W. P. L'HOMMEDIEU, electrical engineer, Westinghouse Electric & Manufacturing Co. Mr. L'Hommédieu, as an engineer representative of one of the great manufacturing houses, is in position to give to the committee able and authoritative data on apparatus and costs of various parts used in electric railway design.



L. S. READY, gas and electrical engineer, California Railroad Commission. The California Railroad Commission has established a national reputation for advanced thought in utility regulation. Mr. Ready, one of the West's most brilliant young engineers, brings to the investigation an unusually helpful share in its work.



HARRIS J. RYAN, professor of electrical engineering, Stanford University. Few names are better known in electrical engineering research than that of Professor Harris J. Ryan. His many years of investigation in high voltage phenomena will prove of inestimable value.

and undeveloped, and to point out in as much detail as possible the location of power sites and their advantages in supply of power for railway electrification.

3. Petroleum and Fuels —

Folsom, Ch.

To collect and tabulate data on the supply and uses of petroleum and other fuels and to point out the advantages and disadvantages that may accrue to conservation of petroleum by railway electrification.

4. Electric Power Utilization —

Cory, Ch., Davis, Jollyman.

To gather data relative to the utilization of electric power and its economy in application to railway electrification.

5. Securities —

Baum, Ch., Cory.

To collect data and discuss the questions of finance that may be involved in the electrification of railways.

6. Theory and Research —

Ryan, Ch., L'Hommédieu, Davis.

To consider questions of technical theory involved in railway electrification and to suggest how matters of technical research or experimentation beyond the scope of this investigation may the better be attacked.

7. Interference —

Ready, Ch., Cone.

To consider possible questions of inductive interference that may arise due to railway electrification on an extended scale, to report on other matters of interference due to highway crossings, railway and accident commission rulings.

8. Editorial —

Cone, Ch., Sibley.

To prepare for publication such matters as may be deemed best for scientific reports or for general public knowledge concerning the activities of this investigation.

Recommendations for Immediate Action

We recommend the following immediate activities:

- 2 (a) That the Water Power committee prepare a chart showing approximately the location of main line railways of the West, the approximate location of transmission trunk lines, of such principal power sites for which data is of easy access and including general ideas as to cost of development and the possible utilization of electric power for industrial use.
- 3 (a) That the Petroleum and Fuels committee bring down to date any additional data that would be helpful in discussing railway electrification and its effect on petroleum conservation.
- 4 (a) That the Electric Power Utilization committee gather data and charts immediately to show whether modern interconnected systems can withstand shocks encountered in railway electrification on an extended scale.

(b) That a preliminary examination of the former investigation report be made with a view to seeing whether recent increased cost of fuel and traffic congestion have not materially altered some of the conclusions there drawn.

(c) That a preliminary report be made as to first railway electrifications that should be considered.

(d) That some preliminary conclusions be drawn as to whether cost of electric power is the vital factor in economy to be attained under railway electrification and to what extent this factor enters.

(e) That a preliminary examination be made and a report submitted concerning the economies of railway electrification where means of power supply are used other than water power.

5 (a) That the Securities committee examine into present railway electrifications in a preliminary way and see how in general railway electrification has affected earnings and the present value of securities.

(b) That this committee also report to us in a preliminary way how in general railway electrification has affected and may in future affect the earnings and securities of existing power companies.

6 (a) That the Technical Theory and Research committee advise us as to whether any difficult new theory must be developed and to what extent intricate research may be necessary in reaching general conclusions we desire on railway electrification.

(b) That the Technical Theory and Research committee advise us as to what steps are proper to take in order to bring about the development of a standardized uniform system of operations and apparatus for the electrification of steam railroads.

7 (a) That the Interference committee give us in a general way a preliminary report on what may be anticipated from the viewpoint of the activities of the committee on interference.

8 (a) That the Editorial committee advise us as to what publicity is desirable and as to what means are available for securing the transmission of the proceedings of this investigation both to the engineering and scientific mind as well as to the public at large.

That we recommend these preliminary reports be made brief and to the point, not exceeding a thousand words for any one subject, exclusive of supporting data, said reports to be considered in committee of the whole at a date to be determined by general committee action.

Possibilities of Railway Electrification

BY CALVERT TOWNLEY

(The argument which will succeed in selling electrification to the railroad man is not how much better electricity does what steam is doing now, but what other things it can do as well. The author, who is assistant to the President of the Westinghouse Electric & Manufacturing Company and president of the American Institute of Electrical Engineers, here contends that it is the fault of the electrical man that many of our railroads are not already electrified.—The Editor.)

Electricity now performs every railroad service previously rendered exclusively by steam locomotives and in every case does it better than it was done before. But in order to use electricity a large investment in equipment and installation must be made and electrification has proceeded slowly because railroad executives were not convinced that the advantages to be gained are always worth the cost.



A long freight train which illustrates the fact that electrical operation saves, in other ways than in greater economies of fuel

Electrical Men to Blame

In reviewing the past twenty years' history of this question, I cannot escape the conclusion that we electrical men, and not our steam road colleagues, are responsible for the slow progress made. We have not known about either the science or the art of railroading. Our belief in, and our zeal for our own profession has led us, albeit with entire honesty of purpose, to make more or less extravagant claims as to what we could do and to underestimate the cost of doing it. The inevitable reaction of mind which followed an accurate determination of facts of course disturbed confidence in our judgment. But if at times we have injured the cause of electrification by claiming too much, strange as it may sound, we have injured it a great deal more by not claiming enough. Electrical engineers not having always been railroad men, have been unable to study railroad problems as they should have been studied, that is to say, with only real and not with any arbitrary limitations before them.

The electrification of a railroad is not simply the substitution of one kind of locomotive for another. It is the adoption of a fundamentally different method of train propulsion. It is conservative to say that, within the bounds of ordinary practice, electricity can furnish every train with all the pulling power that can be used. The limitations of the steam locomotive in this respect disappear and ruling grades rule no longer. A strictly motive power is replaced by one that is practically unlimited.

Increase in Freight Revenue

The business of a railroad is to transport freight and passengers. I put freight first because on the average it produces 73 per cent of the revenue. Unlimited motive power permits longer trains and higher schedule speeds. On the Elkhorn grade of the Norfolk & Western the schedule speed was doubled. It cuts the operating cost by hauling more cars with the same or a smaller crew. The Norfolk & Western uses two electrics to do the work of three Mallets. These new opportunities at one fell swoop banish many of the railroad's time-honored traditions. In a word, electrification opens up tremendous possibilities of increasing the freight capacity of a road and without it being necessary to build additional tracks.

Passenger Advantages

While not as important as freight, passenger traffic likewise comes in for its share in the widened horizon and the vanishing tradition. Unlimited power of course is available, but the absence of combustion is another basic advantage. Smoke and cinders disappear. Tunnel operation loses its terrors. Unobscured signals permit normal speeds with undiminished safety. Projects like the Pennsylvania terminal in New York, depending entirely on submarine tunnel operation and previously impracticable, become immediately possible. Railroads owning valuable realty in cities can erect buildings thereon, where before smoky locomotives made any structure above the ground level impracticable. The aerial rights are now valuable. Multiple unit operation has in fact made suburban traffic. The rapid acceleration made possible by electric traction has directed attention to the equal value of rapid retardation and has quickened the study of braking accordingly; also of modified coach design to bring about the more efficient loading and discharge of passengers. These combined possibilities secure increased schedule speeds and attract patronage.

The Future of Electrification

Taken together in 1910, there were in the United States 240,000 miles of railroad main line, regardless of the number of tracks. Of this mileage approximately 1250, or one-half of one per cent, has been electrified or is today in process. I do not believe that all railroads will ever be electrified. But there are so many cases where electricity should be used, where its advantages are clear and conclusive, that once the railroads escape from the financial slough of despond in which they are now wallowing and are again able to get capital for their needs, there will not be enough engineers, there will not be enough electric factories in the country to serve them.

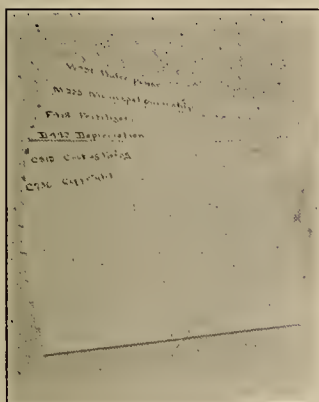
The Business Library

BY LOUISE B. KRAUSE

(You possess the desired information on most subjects connected with your business — would you be able to put your hands on it when it is needed? The subject of filing and cataloging here considered by the business librarian of H. M. Bylesby & Company, of Chicago, is one of the least understood problems of business establishments — and one which makes for greatest efficiency. Attention is called to the need for written permission for the reprinting of these articles.—The Editor.)

CLASSIFICATION AND CATALOGING IN BUSINESS LIBRARIES

All books and pamphlets received by the business library should be classified by subject, i. e., all material on a given subject should be brought together under the same subject number. The most satisfactory working scheme of subject classification



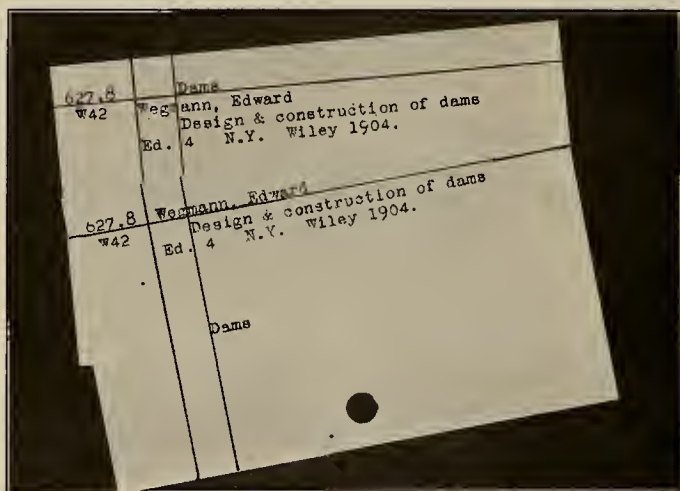
The Dewey Decimal system may be applied to the cataloging of engineering subjects. The cards here shown offer a variety of instances as to how this may be applied. The trained librarian will be able to fit this system into the intricacies of any library.

which has yet been devised and which is most generally used is the Dewey Decimal Classification, Edition 9, 1915, which can be purchased from the Library Bureau, price \$6.00. No subject classification is perfect and the Dewey Decimal Classification will not fit all business libraries equally well, but its elasticity of form and its notation is such that any expansion which may be required by the specialized character of the business library can readily be made by the trained librarian. The following list of extensions to the Dewey Decimal Classification may be of interest to engineers:

- "Extension of the Dewey Decimal System of Classification Applied to the Engineering Industries," by L. B. Breckenridge and G. A. Goodenough, published in University of Illinois Engineering Experiment Station Bulletin 9, revised edition, 1912.
- "Extension of Dewey Decimal System of Classification to Cover Municipal Engineering," by R. De L. French, in Canadian Engineer, Nov. 12, 1914.
- "Extension of the Dewey Decimal System of Classification to the Gas Industry," by D. S. Knauss, American Gas Institute, October, 1914.
- "Extension of the Dewey Decimal System of Classification Applied to Metallurgy, Metallography and Assaying," by R. M. Keeny, Colorado School of Mines Quarterly, Golden, Colo., April, 1911."

It must be remembered that business libraries are small and the number of books and pamphlets to be classified are few as compared with the enormous collections in public libraries, so that the much discussed question of new classifications which arises periodically is not of so vital importance to the business library as might appear, especially so when one recognizes the importance of making an exhaustive subject catalog to all material, which relieves the business library from any undue difficulties in classi-

fication. It will readily be seen that no subject classification can bring together on the library shelves all information on a subject for the reason that some books and pamphlets cover several well defined subjects and the book can stand on the shelf in one subject only. Such difficulties are met most satisfactorily by a subject catalog in which subject entries are made under the most specific subject heading and not under a broad term which includes several well defined divisions of a general subject. For example, a book on steam engines should be subject cataloged under "Steam engines" and not under "Engines," while a book on various kinds of engines should be subject cataloged under "Engines" and not under "mechanical Engineering." The book on en-



The catalog is, of course, filed under the author's name as well as that of its subject matter. The more exact subject of "dams" is better for purposes of filing than "design," which forms the first word of the title.

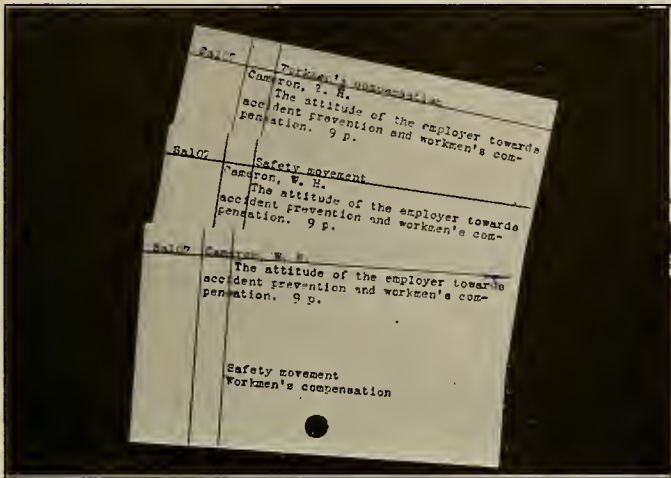
gines, if it treated of Marine engines, Gas engines and various other types could also have cards made under those subjects in addition to the card which was made under "Engines."

This method permits of a book or pamphlet being entered under any number of specific subjects on which it gives information and thus the subject catalog brings together all the information in the library on a specific subject although it may not stand together on the shelves or in a vertical file.

Alphabetic-subject File

All material put into vertical files need not be filed necessarily by a numerical subject classification such as the Dewey Decimal Classification; on the contrary a number of business libraries, which use the Decimal Classification for material put on the shelves, have organized most successful vertical files of miscellaneous material, i. e., miscellaneous photographs, clippings, pamphlets, etc., by the alphabet-

subject method. This simply means that the material is assigned, instead of a subject number, a specific subject name similar to that put on a subject card and is filed alphabetically under that subject name written out in full upon the folder, to which may be prefixed a Cutter number assigned from the subject name of the material. The Cutter number, primarily designed to alphabet authors, is the first letter of a word combined with certain figures, de-



An alphabetical file is often used for material not included under the Dewey Decimal system. A "Cutter number" is used for convenience on catalog cards.

signed to keep words in alphabetic order by their initial letter and the figures following it. The Cutter three figure alphabetic-order table, price \$2.70, or the Cutter-Sanborn alphabetic-order table, price \$3.00, both for sale by the Library Bureau, are equally good for use in the alphabetic-subject file. The Cutter two figure table may be used for a small collection of material.

The advantage in using a Cutter number is, that it makes a convenient brief notation to use on the material to be filed and on the catalog card to show where the material is placed in the file. The alphabetic-subject file obviates the difficulties which arise when the business library finds it has material on subjects for which the Dewey Decimal Classification has not adequately provided. The difference between the alphabetic-subject method of filing and the Dewey Decimal Classification is, that related subjects do not stand together as they do in the latter method, which for example, puts Algebra, Geometry and Trigonometry in logical sequence under the numbers 512, 513 and 514, while in an alphabetic-subject file these subjects would stand like words in a dictionary, under A, G and T, respectively.

Cataloging

Business men as a whole do not understand what cataloging involves nor its supreme importance. Most of them call it card indexing and think they have provided amply for it when they have purchased a card index cabinet and a supply of cards, without realizing what someone has recently said in a business periodical, that "the number of employees and the generosity of mechanical equipment are not the essentials of high grade production. Brains and floor space are unrelated." A card catalog to be a success, as a working tool, must be made according

to a code of standardized rules by some one who has been thoroughly taught to use them. The truth of this contention is apparent when one considers that strict uniformity and accuracy must be maintained, not only in making author entries but particularly in making what the trained librarian calls subject headings with "see" and "see also" references which the business man is often heard to call cross indexing. (See Hitchler, *Cataloging for Small Libraries*, Chapters 5 and 6.) Cataloging must be as accurate as bookkeeping; a wrong figure, a mis-filed card or the entry of information under an incorrect subject, makes the catalog as useless as trying to unlock a door with a key that does not fit. The American Library Association, 78 East Washington street, Chicago, Illinois, has issued a valuable list of suggestive "Subject Headings for Use in a Dictionary Catalog," third edition, price \$2.50, which indicates proper terminology with cross references, and to which each business library will probably make many subject additions to suit its specific needs. The subject headings used in the "Reader's Guide to Periodical Literature" and the "Industrial Arts Index," mentioned in a previous article, are also of help to the business library in determining adequate subject headings for the card catalog. The ability to assign subject headings and cross references correctly requires both broad knowledge and a high degree of training and is one of the important assets which the business librarian derives from a library school education.

For the benefit of small offices which have a limited collection of material and will need to do very little cataloging or indexing, the accompanying sample author and subject cards are given to illustrate correct form.

Further helpful suggestions can be obtained from Hitchler's *Cataloging for Small Libraries*, published by the American Library Association, 78 East Washington street, Chicago, Illinois, price \$1.25.

It is advisable that the card catalogs to material in the business library should be, as far as possible, alphabetized together in a single file, because information on a subject found in a book is cataloged under a specific heading, information on the same subject found in a periodical article is entered under the same subject heading as that used for the information in the book, and the same subject heading is used in the card catalog for the material which, because of its form, is put into the vertical file. The filing of these three subject cards together instead of in three separate card catalogs, namely, to books, periodicals and vertical file material, will show at once what the library has on that particular subject with a saving of time in consultation, as well as eliminating the risk of forgetting to look in three separate catalogs when investigating a subject, and avoiding the danger of mis-filing a card in a wrong catalog. If desired, references to periodical articles and vertical file material may be put on colored cards to show more quickly the disposition of the material in the library. Photographs, lantern slides, cuts and maps are best cared for by a separate card catalog to each file.

PRACTICAL LESSONS IN ELECTRICITY

BY H. H. BLISS

(A comprehensive survey of the fundamentals of electricity is the object of this series of articles. They constitute the text for the course being given in connection with the Extension Departments of the Universities of California and Oregon. Back issues will be furnished to those wishing to enter the course now. This is the eighth lesson.—The Editor.)

LOSSES AND REACTIONS IN D. C. GENERATORS

Copper Losses.—When a d.c. generator is sending current through a line and a load, as in Fig. 1, the number of amperes is found by dividing the generated voltage by the total ohms of the circuit, which means the sum of the resistances of the load and the line **plus** the resistance in the armature, commutator and brushes. It is to be emphasized that the

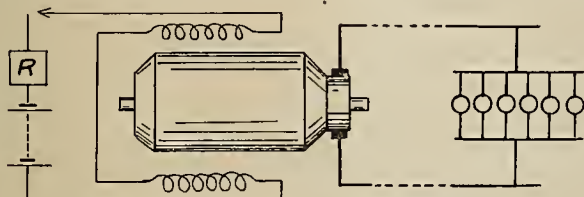


Fig. 1.—Separately excited d.c. generator.

electromotive force has to overcome resistance in the generator as well as in the external circuit. Thus there is a conversion of electric energy into heat energy in the inductors, the watts wasted here being termed the "armature copper loss." It is calculated by multiplying the armature resistance by the square of the number of amperes flowing through it; in Fig. 1, this is the same as the line current, but in Fig. 3, it is greater by the amount of current used in the shunt field.

One can measure the resistance of an armature by sending a small current through it, measuring the voltage drop, and calculating by Ohm's law.

The resistance of an armature may also be determined from the size and length of the wire used in winding.

As shown in Fig. 2, an armature coil may consist of a single turn of wire, running from one commutator bar to and through the top of one slot, then across the back of the armature and forward through the bottom of another slot to the bar adjacent to

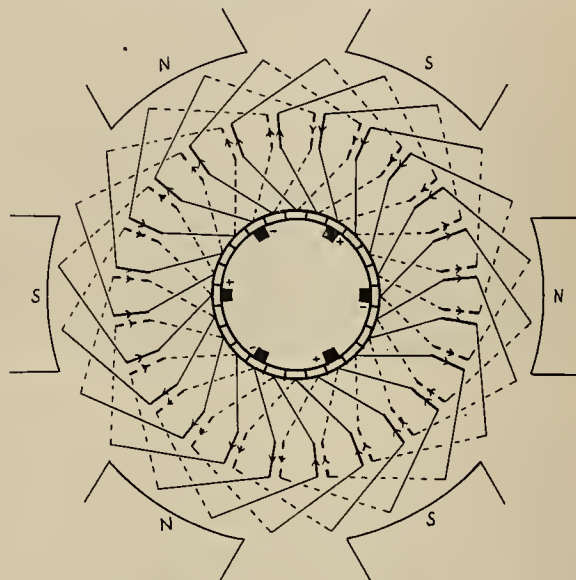
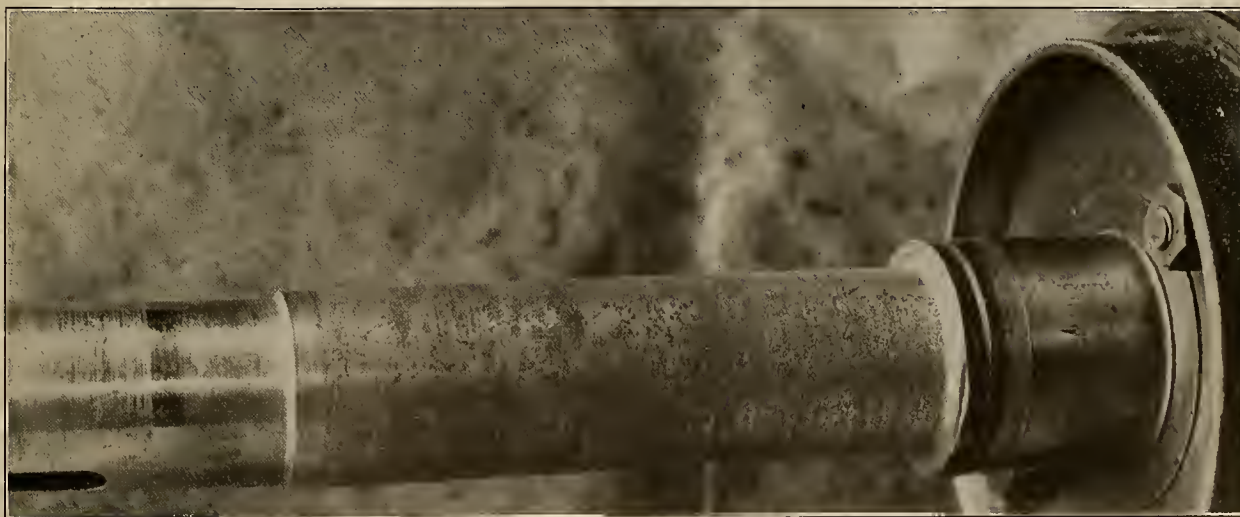


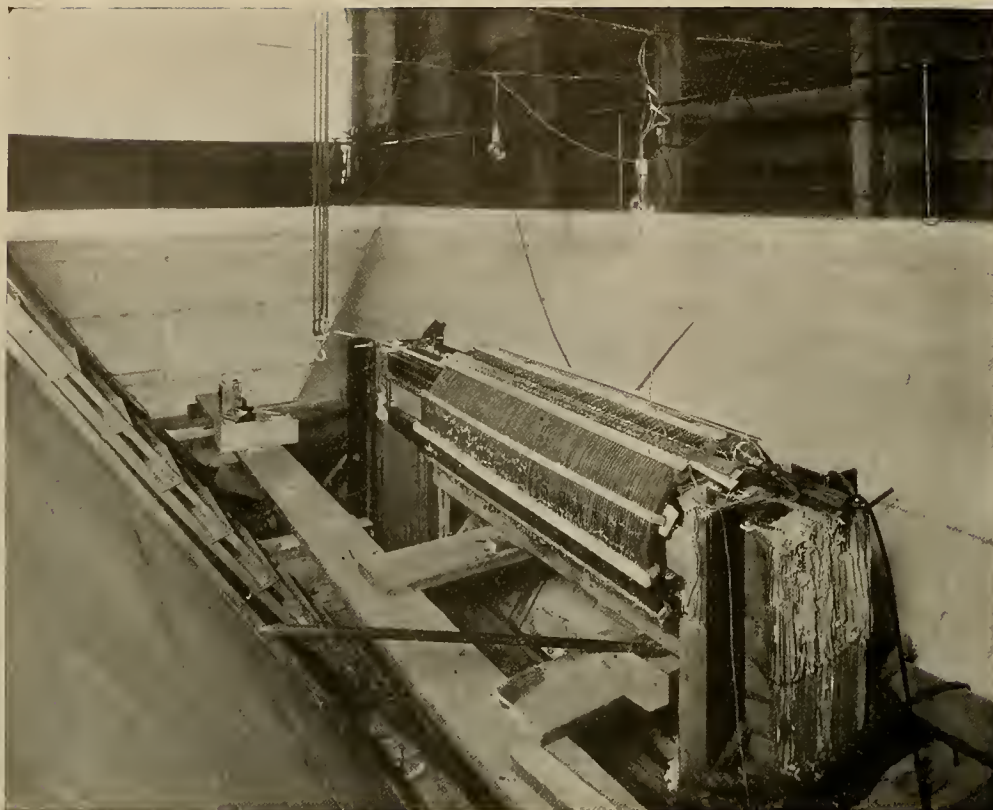
Fig. 2.—"Multiple Winding" for a 6 pole d.c. armature. The heavy radial lines with arrow heads represent the inductors. The dotted inductors are in reality placed beneath the solid ones shown beside them. The brushes are drawn inside the commutator to simplify the sketch.

the first one. The radial part of the line represents the inductor, which is shown dotted when at the bottom of a slot.

In small machines there are usually several turns per coil, the wire running around several times through the same two slots, with the ends connected



The pitting in this generator shaft was caused by currents induced in the metal by a varying magnetic flux. The current flowed through the shaft and frame, crossing the oil film at two bearings. Until the bearings were insulated there was a very severe loss of power here.



Here is the million volt transformer used in the 1915 exposition. Note that the windings are placed around an iron core made of many thin sheets. All transformers have laminated cores to cut down the eddy current loss.

to adjacent bars. If each coil in Fig. 2 contained 30 turns of No. 10 wire, of a total length of 80 ft., its resistance would be $80 \times .000997 = .08$ ohm. As there are 24 coils and 6 brushes, there are four coils in series, with a resistance of $4 \times .08$ or .32 ohm. Current flows through the armature in 6 parallel paths, and hence the combined resistance $= .32 \div 6 = .053$ ohm.

The "current rating" of an armature is the number of amperes it can safely carry. It is evidently equal to the current which one wire can carry multiplied by the number of parallel branches in the armature.

If the safe current in each inductor of the armature of Fig. 2 is 15 amperes, the current rating is 6×15 , or 90 amperes. There being 120 inductors in series, the generated voltage $= 120 \times .7$ if conditions of flux and speed are so arranged as to give .7 volt per inductor. The power generated $= 84 \times 90 = 7560$ watts. The armature copper loss $= 90 \times 90 \times .053 = 430$ watts, so that the output of the armature is 7130 watts.

The same armature might have a "series" or "wave" winding, which has only two parallel paths. With the same total number of inductors there would be 360 in series and a voltage three times as high as with the multiple winding. The current could, however, be only 30 amperes, and the power would be the same as before. The armature copper loss may be shown to be the same with both methods of winding.

There is resistance at the contact of the brushes and the commutator and in the material of the brushes. This causes an electrical loss which varies with the load carried.

Another important loss of power occurs in the field windings. In Fig. 1 suppose the field resistance

to be 17 ohms and the current supplied to be 3 amperes. The power loss $= 3 \times 3 \times 17 = 153$ watts. If the rheostat is set at 4 ohms, there is a further loss there of 36 watts. Compound generators have copper losses in both shunt and series fields. Thus, if the "brush voltage" is 120 in Fig. 3, the shunt

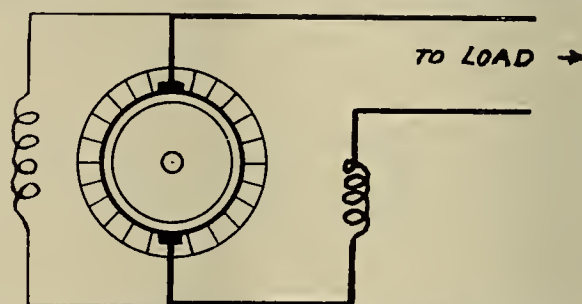


Fig. 3.—This compound wound generator has a loss of 960 watts in the shunt winding and 400 watts in the series coils.

current 8 amperes, the load current 200 amperes and the series field resistance .01 ohms, the shunt loss $= 120 \times 8 = 960$ watts and the series field loss $= 200 \times 200 \times .01 = 400$ watts.

Mechanical and Iron Losses.—In a d.c. generator there are three kinds of mechanical power losses and two different iron losses. The former include bearing friction, "windage" or air friction, and friction between the stationary brushes and the moving commutator. The iron losses include those due to "hysteresis" and "eddy currents."

Armatures are influenced by the poles which surround them and become magnets themselves. As they rotate their magnetic condition must be continually changing, for each particle of iron is magnetized as it passes one pole and remagnetized in the opposite sense when it reaches the next. The particles oppose this change by what seems like internal

friction, and the energy thus wasted (changed into heat) is the "hysteresis loss."

As the lines of force cut through the armature iron, currents of electricity are induced in it by exactly the same process as the currents in the armature wires. These "eddy currents" require the expenditure of energy and produce heat. To minimize the currents, which tend to flow parallel to the inductors, the armature is built of thin circular sheets, or "laminations" of iron. The oxide on the faces of the sheets forms an insulator which prevents passage of the currents and thus reduces the eddy loss to a relatively small amount.

Armature Drop and Reaction.—In a separately excited machine (Fig. 1) or a shunt generator the brush voltage is lower when a load is carried than when the external circuit is open. One cause is the "armature drop," another is the "brush contact drop" and a third is the "armature reaction." It is to overcome these as well as "line drop" that the compound winding shown in Fig. 3 is used.

There is always a voltage drop in a conductor which carries current, and this is true even in an armature where voltage is being generated. Then in the armature of Fig. 2 with a resistance of .053 ohm, the drop is $90 \times .053 = 4.77$ volts when the machine produces 90 amperes. This would reduce the voltage from the generated pressure of 84 to 79.23 volts.

Due to the contact resistance between the commutator and brushes there will be a further drop of about one volt.

The armature inductors carrying current tend to make the armature a magnet with poles between the pole pieces of the generator. This results in lessening the total flux through the armature and makes other disturbances which lower the efficiency of the machine. The whole effect, known as "armature reaction," varies with the amount of current being drawn by the external circuit. Armature reaction is counteracted in various ways, such as shifting the brushes, building the generator with "interpoles," and putting "compensating windings" upon the pole faces.

BAKE OVEN TESTS

The interest called forth by the recent tests on the large bake oven installed by the Haynes Foster Baking Company at Portland, Oregon, for which current is furnished by the Northwestern Electric Company, which appeared on page 580 of the June 15th issue of the *Journal of Electricity*, has called attention to a slight typographical error in the tables there given. The last column should read "Average kw-hr. per 1000 loaves" in place of simply "Average kw-hr. per loaves" as it now appears. The figures then read:

AVERAGE KW-HR. PER 1000 LOAVES						
Oct. 7th	8th	9th	13th	23d	24th	25th
59.8	66.3	76	77	62.8	71.2	67.4
Daily average — 67.4,						

GOVERNMENT WINS TWO LAWSUITS AFFECTING THE NEWLANDS PROJECT

(A recent important decision which affects possible cases of injury from seepage waters following in the wake of storage and irrigation projects.—The Editor.)

The Natron Soda Company, a corporation owning what is known as Big Soda Lake, in Churchill county, Nev., brought suit against the United States in the Court of Claims for \$170,000 damages, claimed to have been suffered by the company through the flooding of the lake and their soda manufacturing plant, by seepage waters from the Newlands irrigation project, as reported in the *Reclamation Record*. April 7, 1919, the court found that the company had in fact sustained a loss of \$45,000, but dismissed the petition upon legal grounds. The following excerpt is from the opinion handed down by the Court of Claims:

Such a right as that claimed by the plaintiff is too indefinite and unlimited. The principles applicable to surface waters do not pertain to underground waters which have no certain course or defined limits. In the case of *Kansas v. Colorado*, 206 U. S., 46, 107, the court says: "Indeed, the extent to which seepage operates in adding to the flow of a stream, or in distributing water through lands adjacent to those upon which water is poured, is something, proof of which must necessarily be almost impossible. The underground movement of water will always be a problem of uncertainty." Percolating water is a hidden, invisible thing. How it moves is more a matter of conjecture than knowledge, of inference rather than proof. It would seem impossible to apply any law, beyond the general principle of reasonable use of one's land, to such a hidden and formless thing. (Weil on Water Rights, vol. 2, p. 1093.) It seems, therefore, that the existence, origin, movement, and course of underground waters, and the causes which govern and direct their movements, are so secret, occult, and concealed that an attempt to administer any set of legal rules in respect to them would be involved in hopeless uncertainty and would be practically impossible, because any such recognition of correlative rights would interfere to the material detriment of the commonwealth with drainage and agriculture, mining, the construction of highways and railroads, with sanitary regulations, buildings, and general progress of improvements in works of embellishment and utility. (Angell on Watercourses, 7th edition, 171.)

It seems to us that while the property of the plaintiff may have been destroyed by the irrigation system of the Government, yet the influences which have brought about this destruction are so secret, changeable, and uncontrollable that we can not subject them to the regulations of law nor build upon them a system of rules as has been done with streams upon the surface; so that if the plaintiff has incurred a loss from the movement of these underground waters in this valley it is *dammum absque injuria*.

It would appear that the claim of the plaintiff is that primitive conditions must be suffered to remain and that no progress or development can be had if the property of the plaintiff should be injured thereby. Thus a claim is set up to a vested right to keep conditions in statu quo which existed at the time its property was acquired to the extent of preventing anyone from improving surrounding property, unless damages are paid to the plaintiff. Such a doctrine would result in preventing the owners of surrounding property from putting their property to its legitimate use.

From the very nature of the case and the character and movement of underground water we conclude that the property of the plaintiff was not destroyed by a direct invasion, but was the incidental consequence of the lawful and proper use of a Government power, and therefore there can be no recovery.

The John Horstmann Company, another soda concern operating in the same territory, brought a similar suit for \$35,000 damages. This case was decided on the same day and in the same manner as the first-mentioned action.

Recent Western Water Law

BY A. E. CHANDLER

(Recent cases clarify points as to riparian rights hitherto debated. An owner, it is determined, may sell a portion of his land not adjacent to a stream and with it a portion of the water rights which belonged to the tract as a whole. On the other hand a new non-riparian tract added to land adjacent to a stream does not increase the riparian rights. The basis of a water right is further clearly defined by the District Court of Appeal. These cases are here reviewed by the President of the California Water Commission.—The Editor.)

NOTES FROM RECENT CASES INVOLVING RIPARIAN RIGHTS

In a series of articles prepared by the author for the Journal during 1912, the following statement was made in discussing the doctrine of riparian rights:

"In the quotation from Anaheim Union Water Company v. Fuller, above, it is stated that in a partition of a riparian tract the part distant from the stream loses its riparian right 'unless the conveyance declares the contrary.' A number of Spanish grants crossed by streams are now being subdivided, and the deeds are so drawn that the various parcels share in the riparian right, regardless of proximity to the stream. It is well settled that the parcels so conveyed retain the riparian right among themselves, but the western courts have not yet directly passed upon the question as to whether the owner of such a parcel not touching the stream can be considered to possess a riparian right as against an appropriator or riparian owner outside the original grant. Mr. Wiel, in the third edition of his splendid work on 'Water Rights in the Western States,' raises this question and after an exhaustive study of the cases bearing on the point, concludes that such parcels not bordering upon the stream cannot be considered riparian when in conflict with rights outside of the grant. The conclusion is certainly based on sound reasoning and conforms to the basic idea that only lands bordering upon a stream are riparian thereto. This question will undoubtedly be raised in the near future and the hope of all appropriators is that the courts will accept Mr. Wiel's conclusion."

The question was raised in the case under comment, and the Supreme Court of California decided against the contention of Mr. Wiel, who was counsel for the plaintiff in the litigation and who presented a very forcible argument to the court along the lines of his original text. The new principle laid down in the case is well stated in the second of the two following paragraphs, which were printed as headnotes—the first headnote being a statement of a principle previously laid down and now well accepted:

"An owner of a tract of land abutting upon a natural stream may upon a division and sale of the tract in separate parcels apportion and preserve to each parcel sold a portion of the water right, regardless of the proximity of such parcels to the stream, and such apportionment is good as between the owners of the several parcels."

"Such an apportionment or transfer is also good against owners of other riparian lands upon the same stream, not part of the tract from which such parcels are conveyed, and an owner of such a parcel not bordering on the stream can take water as against a lower claimant upon the natural stream who had no part in the stipulation and who was a stranger to the transaction."

Miller & Lux v. Jefferson G. James,
et al., 57 Cal. Dec. 265:

When the owner of land riparian to a stream purchases a non-riparian tract adjoining, the new tract, although having physical access to the stream through the original tract, cannot be considered riparian. This principle was laid down by the Supreme Court of California a number of years ago, but the opposite contention was made in this case. The following curt expression of the court shows very clearly that the principle is no longer debatable:

"Defendants urge that the trial court should have found that they owned 29,000 acres of riparian lands instead of 19,500 acres. This claim is based upon their contention, to quote from their brief, that 'land adjoining riparian land may, by becoming united therewith in ownership, become itself riparian if accessible to, susceptible of irrigation thereby and situate within the watershed of the stream.' Our decisions are to the contrary, and there is nothing in the point urged. (*Lux v. Haggin*, 69 Cal. 255, 424; *Boehmer v. Big Rock C. & I. Dist.*, 117 Cal. 19, 26; *Anaheim Union Water Co. v. Fuller*, 150 Cal. 327, 331.)"

Felsingthal v. Warring, 28 Cal. App. Dec. 456:

The following quotation from the decision of the California District Court of Appeal is given not as stating a new principle, but as a re-statement of principles now well accepted regarding the adjudication of riparian rights. The court elsewhere in the opinion emphasizes the point that an appropriator's right is limited to the quantity of water actually put to a useful purpose, and not to the capacity of the ditch—the "erroneous theory" referred to in the quotation below was the one adopted by the lower court in allowing appropriators (the respondents) the full capacity of the ditch rather than the smaller amount put to beneficial use:

"Since appellant is a riparian owner, the decree should not have attempted to limit his water right to the right to divert a fixed quantity—two and three-fifteenths inches—for irrigation and domestic uses. The right of a riparian proprietor in or to the waters of a stream flowing through or along his land is not the right of ownership in or to those waters, but is a usufructuary right—a right, among others, to make a reasonable use of a reasonable quantity for irrigation, returning the surplus to the natural channel, that it may flow on in the accustomed mode to the lands below. Use does not create the right; disuse cannot destroy or suspend it. If his needs do not prompt him to make any use of the waters, he still has the right to have them flow, onto, and along, and over his land in their usual way, excepting as the accustomed flow may be changed by the act of God, or as the amount of it may be decreased by the reasonable use of other riparian proprietors or prior appropriators, if any there be. (*Hargrave v. Cook*, 108 Cal. 72.) The voice of the decree is that it limits appellant's right to such an amount as he may use for irrigation and domestic purposes upon his thirteen acres of arable riparian lands. He owned 137½ acres, all of which was riparian to the stream and included the thirteen acres of irrigable arable land. As between himself and respondents, appellant's right to the waters of the stream has no limitation, save as it is limited by the superior right of respondents as the owners of an appropriator's or adverse user's right. So limited, appellant's right to take water from the stream—as against respondents—might be more or less than two and three-fifteenths inches. Instead of fixing a definite quantity that appellant may take from the stream, and decreeing that his interest in the stream is confined to the right to divert such fixed quantity for irrigation and domestic uses, the court should have determined the amount that respondents are entitled to divert, and should have decreed that appellant has all the rights of a riparian proprietor, limited only by respondents' superior right to take from the stream a quantity ascertained and fixed by the court. True, the court did undertake to fix the quantity that respondents have the right to take from the stream, but in so doing proceeded upon an erroneous theory; and the finding that respondents are the owners of the waters of Hopper Creek to the extent of sixty inches is not supported by the evidence."

SPARKS—Current Facts, Figures and Fancy

(You may not know that a certain herd of cattle has been doing effective work in helping the country go dry; that some dead horses are worth a good deal of money; that cats are employed in United States post offices; that—but this is not officially a menagerie page, and your attention is therefore drawn to a number of improving items dealing with population, aerograms and the coal trade.—The Editor.)

Getting married by long-distance telephone is the latest in wedding novelties. A ceremony was recently performed in this way, the bride being in Ashland, Oregon, and the bridegroom in Denver.

* * *

Pieces of wood stamped with a die circulate as cash in the territory controlled by the Hudson Bay Trading Company. The unit of value is a beaver skin, and forty muskrats are equal to one beaver.

* * *

Not many horses are worth \$100 when they have been dead for over half a century, but it is reported that the United States has just allowed a citizen \$100 for a horse of his which was killed in the Civil War.

* * *

Birth statistics are cheerful reading for the electrical man. In 1917 there were 1,353,792 prospective electrical customers born in the birth-registration area of the United States, and births outnumbered deaths by 74.4.

* * *

The state of North Dakota has one bank for every 948 population—leading all other states in the number of banks per capita. South Dakota is second on the list, and the Philippines bring up the rear with one bank to every 1,000,000 persons.

* * *

That a system of profit-sharing existed in Babylon 4000 years ago appears from a letter written on an ancient clay tablet lately discovered. Perhaps we are not so uniquely "advanced" after all, and may yet discover that Cleopatra used an electric iron.

* * *

Neither the temperance idea nor the good-roads campaign seems to have any influence on the egotism of cattle. A herd of these recently stopped road-building operations by drinking up 10,000 gallons of water so that there was not sufficient left to mix the cement.

* * *

Iceland has linotype machines. There is no particular reason why it should not have them, but somehow we always associate Iceland with snow huts, polar bears and the midnight sun. There was a printing office in Iceland before the middle of the sixteenth century, and the first linotype was installed in 1914.

* * *

Aerograms between England and France are being suggested as a relief to the overloaded cables. The message would be telephoned to the aerodrome

outside London, carried across the Channel in high-speed aeroplanes leaving at regular intervals, and telephoned direct from the aerodrome outside Paris. The service would take about two and a half hours.

* * *

The Imperial Government of Japan is to equip its railway trains with wireless telegraph apparatus. Hitherto accidents on the line have been made known to the driver by means of flags and other signals which sometimes, during heavy storms, failed to convey the necessary warning in due time. The wireless plan is to be adopted as a safety measure.

* * *

A municipal restaurant has been opened at Brest with a view to relieving the pressure of the high cost of living among the working people. For the French equivalent of about forty-three cents this restaurant serves a meal of soup, meat, one vegetable, dessert and wine. Tipping is prohibited and no foreigners are served. Over one thousand persons are served daily.

* * *

On the staff of the Philadelphia post office are fifteen to twenty cats which act as an anti-rat police force. Cats are also employed in the United States Printing Office where they are said to have saved many valuable documents from rats. In some cases postmasters have virtually put cats on their payroll by requesting the department to grant an allowance for the purchase of food for them.

* * *

The United States has been putting coal on board steamers at about \$5.50 per ton as compared with about \$15 per ton in England. American cargo is now being discharged at Stockholm, and it is claimed that the United States might even supply London more cheaply than Northumberland or Durham could. It seems that the phrase "carrying coals to Newcastle" may one day lose its standing among proverbs.

* * *

At the time of the signing of the armistice there were approximately 500 manufacturing plants in the United States which, operating under government lease or contract, were engaged in supplying equipment to the various war department bureaus. Aside from the government arsenals, practically all these plants were turning out materials foreign to their peace-time production. At the close of the war the government had to take over the surplus war commodities and plant equipment and is now engaged in disposing of it methodically.

PERSONALS

John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company and well known to electrical men throughout the

nation for his far-sighted stand on public utility matters, has received the signal honor of the appointment to the chairmanship of the Public Policy Committee of the N. E. L. A. Mr. Britton has served in the past as chairman of this committee for the Pacific Coast Section N. E. L. A. and the broad-minded reports prepared under his leadership have always been features of the

western conventions. His selection for the national position comes as a fitting recognition of his work in district affairs. Mr. Britton's record of war service through the many channels open to him as a public utility official gives him the right to be included among those whose achievements are recorded elsewhere in this issue, but it was felt that the importance of this appointment should be acknowledged here.

R. H. Holtermann, sales manager of the Holabird Electric Company, is at Los Angeles in his Mitchell six with his family.

W. R. Putnam, vice-president and general manager of the Idaho Power Company at Boise, was a recent visitor in Salt Lake City.

N. W. Blockett, attorney for the Puget Sound Traction, Light & Power Company, has been motoring through California with his family.

W. B. Stephenson, representing the Delta Electric Company, Marion, Ohio, with headquarters in San Francisco, is in Seattle on business.

Rosie Gibson has resigned from the Gibson Electric Supply Company of Oakland, California, to open an electrical supply house in Oakland.

Frank Blake, of the Hawaiian Electric Company, Hawaii, has been a recent visitor in San Francisco, but has returned again to Honolulu.

O. A. Schlesinger, apparatus salesman with the Western Electric Company at San Francisco, is spending his vacation at Witter Springs, California.

R. E. Fisher of the commercial department of the Pacific Gas & Electric Company, is spending his vacation in the Yellowstone National Park.

J. F. Lincoln, vice-president of the Lincoln Electric Company of Cleveland, Ohio, has been visiting the west coast and spent some time in San Francisco.

H. W. Lawrence, of the New England Electric Company of Denver, has just returned from the session of the Electrical Supply Jobbers at Hot Springs, Virginia.

George W. Bixler of the Denver Gas & Electric Company, with headquarters in Denver, is correspondent for the Journal of Electricity in the Colorado district.

Fred Gleason, telephone sales manager of the Western Electric Company, visited Salt Lake City, Los Angeles, San Francisco and Seattle during the past month.

Paul Quick, of San Francisco, representing Landers, Frary & Clark of New Britain, Connecticut, manufacturers of universal heating devices, is making a business visit to Seattle.

Dr. W. W. Campbell, Director of Lick Observatory of the University of California, has gone to Europe in an important capacity as head of a delegation of astronomers meeting in Brussels during July.

D. F. McGee of the Electric Bond and Share Company is a Salt Lake City visitor. Mr. McGee is on an inspection trip of the Utah and Idaho properties of the Bond and Share Company and will probably remain in the territory for a month.

N. J. Sigfrid, managing director of A. B. Knislingewerken, of Vanas, Sweden, is a recent Pacific Coast visitor. Mr. Sigfrid is a member of the Swedish Industrial Commission and is particularly interested in the development of electrical heating appliances.

F. B. Clapp, of the Railway Department of the General Electric Company's Melbourne office, recently passed through San Francisco on his way to the company's headquarters at Schenectady. Mr. Clapp will probably be located permanently in this country from now on.

C. P. Veenhof, representative of N. V. L. E. Tels & Co.'s Handel-Maalscappij of Amsterdam (Holland), is a recent San Francisco visitor. Mr. Veenhof has his headquarters at Batavia in the Island of Java and is engaged in importing engineering and machinery supplies in the Dutch East Indies.

Capt. C. E. Grunsky, Jr., of the 115th Engineers, has arrived in this country from France where he has been with the army of occupation. Captain Grunsky, who is well known to readers of the Journal of Electricity as a contributor, was engaged in estimating intangible losses on mines in France shortly after the armistice was signed.

M. H. Wagner, electrical engineer for the U. S. Bureau of Standards, is a recent San Francisco visitor. Mr. Wagner comes as the result of a cooperative movement between the N. E. L. A. and the Bureau to study points of conflict or misunderstandings relative to orders proposed in the National Safety Code, and is visiting all Pacific Coast electrical centers.

J. C. Merriam, Professor of Paleontology at the University of California and acting chairman of the National Council of Research, has been elected president of the Pacific Division of the American Association for the Advancement of Science, to succeed Dr. D. T. McDougal, director of the Desert Botanical Laboratory of the Carnegie Institute of Tucson, Arizona.

Stuart Hobbs Sims, associate professor of mechanics and hydraulics in the University of Iowa, has been appointed head of the department of civil engineering to succeed Professor C. B. McCullough, who is now state highway bridge engineer. Professor Sims has held prominent positions and done important work in connection with structural, hydraulic and railroad engineering projects.

E. A. Eardley of Eardley Bros., Salt Lake City, has been elected to the secretaryship of the recently organized

Electrical Contractors and Dealers' Association of Salt Lake City. D. W. Forsberg was chosen as president. Both Mr. Eardley and Mr. Forsberg have been prominent in contractor-dealer affairs in the Inter-mountain district and have done much to make this new organization for the betterment of the merchandising conditions of that region possible. The new association starts with the firm foundation of high ideals

and practical good feeling and receives the good wishes of the electrical industry for its prosperity and continued success under Mr. Forsberg's able leadership.



W. H. Gribble, of the Western Gas & Electric Company of Chico, has been staying in San Francisco.

W. I. Otis of the Square D Company, with headquarters in San Francisco, was in Seattle recently on business.

J. J. Baeder of Salt Lake City, manufacturer of electric supplies, has been spending some time in San Francisco.

Neil C. Hurley, president of the Hurley Washing Machine Company, is among recent San Francisco visitors of importance.

H. H. Lewen of the Sierra Electric Company, manufacturers' agents at San Francisco, is expected to return from the East shortly.

A. E. Chandler, president of the State Water Commission of California, is visiting in Los Angeles in connection with commission work.

L. E. Gearhart, representing Crouse-Hinds Company, spent several days in Seattle recently while en route from Spokane to San Francisco.

I. L. Capps has resigned from the sales department of Thomas Day & Company of San Francisco to join the Gibson Electric Supply Company of Oakland.

Van Rensselaer Lansingh, formerly general manager of the Holophane Company of Cincinnati, has been elected president of the Lunken Window Company of Cincinnati.

J. G. Bourns, manager of the Puget Sound Gas Company, Everett, Washington, has been appointed editor of the "Log," the official paper of the Everett Rotary Club.

J. W. Beckman, electro-chemical engineer with the Beckman-Linden Engineering Company of San Francisco, is again at his home office after a six weeks' business trip to eastern cities.

Frank P. Deering, vice-president of the Union Trust Company of San Francisco, has gone to China for a stay of several months. Mr. Deering is accompanied on his trip by Mrs. Deering.

C. P. Bowie, petroleum engineer of the U. S. Bureau of Mines, in charge of the San Francisco office, has recently returned to San Francisco from a trip through the oil fields of Oklahoma and Texas.

Max Loewenthal of the Globe Commercial Company, San Francisco, has recently returned from an extended trip through the Northwest and Middle West, where he has been visiting various factories.

F. F. Winfree has been appointed manager of the Sandpoint, Idaho, division of the Mountain States Power Company. Mr. Winfree was formerly connected with the Richmond, California, division of Western States Gas & Electric Company.

H. J. Gille, sales manager, and E. A. Batwell, publicity agent of the Puget Sound Traction, Light & Power Company, Seattle, are recent San Francisco visitors. Mr. Gille is president of the Northwest Electric Light and Power Association.

Franklyn W. Oatman, a civil engineer of San Francisco, and a graduate of the University of California with the class of 1912, has been appointed professor of structural engineering at Pei Yang University, Tientsin, China. He will leave for the Orient in August.

A. G. Wishon, general manager of the San Joaquin Light & Power Corporation, is visiting San Francisco this month. Mr. Wishon was among the many important electrical men who recently gathered for the discussion of N. E. L. A. plans and prospects.

T. W. Osgood has been appointed to the new post of Assistant Superintendent of Safety with the Industrial Accident Commission of California. Mr. Osgood has been connected with the Commission's Safety Department for several years past. His headquarters will be in Los Angeles.

R. A. Dailey, secretary of the Pacific Coast Shippers' Association, has recently returned from a trip to Europe. As a result of his studies of conditions over there, Mr. Dailey affirms that building activities in England, France and Bel-

gium will call for large lumber exportations from the Northwest.

Edwin A. Rogers, power plant engineer for the New Cornelia Copper Company, Ajo, Arizona, is a recent San Francisco visitor. Mr. Rogers was formerly on the steam engineering staff of the Pacific Gas & Electric Company and was later efficiency engineer for the Palace Hotel Company.

H. G. Baker, for the past eight years connected with the new business department of the Western Colorado Power Company, Salt Lake City, a subsidiary of the Utah Power & Light Company, has left that company to assume the management of the Clark Electric Power Company with headquarters at Tooele, Utah.

Philip N. Moore, mining engineer of St. Louis, now in the government service, is in San Francisco hearing claims in connection with mine losses consequent to the signing of the armistice. Mr. Moore is scheduled to address a meeting of the Engineers' Club of San Francisco on the subject of the National Department of Engineering.

Harold A. Petterson, professor of hydraulic and sanitary engineering, Pei Yang University, of Tientsin, China, is a recent San Francisco visitor. Mr. Petterson was formerly engaged as an engineer on the Los Angeles Aqueduct and is enjoying a season of rest from his duties in the Orient. He expects to return to China in September.

W. A. Hillebrand, one of the high voltage experts of the laboratory of the Federal Telegraph Company, Palo Alto, California, has gone from Palo Alto to the Ohio Brass Company of Mansfield, Ohio. With the departure of Professor Hillebrand the Federal Telegraph Company has two vacancies on its staff of experts, Dr. Leonard Fuller of the same company having recently accepted the assistant managership of the Ohio Insulator Company.

William von Phul, who for the past three years has been vice-president and general manager of the United Railroads, was elected to succeed the late Jesse W. Lilienthal as president at a recent meeting of the board of directors. Mr. von Phul, who is a member of the engineering firm of Ford, Bacon & Davis, brings to his new office many years of valuable experience. Before coming to San Francisco he was manager of the American Cities Company, a corporation operating street car lines in New Orleans, Birmingham, Memphis and Little Rock.

Calvert Townley, assistant to the president of the Westinghouse Electric & Manufacturing Company, was elected president of the American Institute of Electrical Engineers at the annual business meeting of the Institute held on May 16, in New York City. The newly elected president joined the American Institute of Electrical Engineers in 1901 and has been almost continuously active therein ever since. During the year past he has been an American Institute of Electrical Engineers trustee, and first vice-president of the United Engineering Society, a member of Engineering Council, chairman of the Public Policy and of the Development Committee.

Gerard Swope, president of the International General Electric Company, was the guest of honor at a dinner, given on July 3rd, by electrical men of Tokyo to welcome him on the occasion of his arrival in that city. Two years ago, when he went to Japan as vice-president of the Western Electric Company, Mr. Swope was honored with the Order of the Rising Sun, conferred on him by the Emperor. In his new capacity as president of the International General Electric Company he has received a most enthusiastic welcome in the electrical circles of the Orient.

OBITUARY

John B. Whitlock, western civil engineer, died recently at Scranton, Iowa. Mr. Whitlock was well known as a bridge builder in Portland, where he lived for many years, and had built more than seven hundred bridges west of Chicago.

War Service of Western Engineers

(Western engineers have established an enviable record for war service in the great conflict just past. Not only were the names of many represented by stars, some of them in gold, on the honor roll which is the pride of every engineering organization throughout the country, but in service through national and local committees and through the regular channels of their profession, by conservation and special achievement in the interests of research and economy, the engineers of the West helped to make possible the concentrated effort of the war. The names appearing on this page are but examples of the patriotic service contributed by the many, and through them tribute is paid to the engineering profession as a whole.—The Editor.)

Among the distinguished war records of Western engineers other than in military channels, the following examples are typical:

HERBERT HOOVER, international food administrator, a charter member of San Francisco Engineers' Club, a graduate of Stanford University of California, for years well-known in mining engineering activity throughout the world. As long as mother's tongue shall breathe to infant child the suffering and languishing due to international carnage and strife of those terrible years 1914-1919, so long will the name "Hoover" remain a household word of gratitude and thankfulness. Although Mr. Hoover's war work has not been primarily

along engineering lines, he has been recognized by the public as an engineer and undoubtedly his service has done much to demonstrate to the world at large the ability of the engineer in executive positions.

CHAS. C. MOORE, president of Chas. C. Moore & Company, Inc., engineers of San Francisco, formerly president of the Panama-Pacific International Exposition, and chairman of the California State Council of Defense. The effective work in throwing every resource of the commonwealth to the service of the nation in its hour of need will remain as a lasting and enduring monument to Mr. Moore's well known executive ability, which was first called to international attention during the wonderful exposition days of 1915.

W. F. DURAND, professor of mechanical engineering, Stanford University, and chairman of the National Advisory Committee on Aeronautics, later to be appointed Scientific Attache at the American Embassy in Paris. The effective interchange of scientific and technical information on war problems between the United States, France, England and Italy thus made possible a close contact with the great research laboratories and research workers that will ever reflect the credit and ingenuity of engineering talent that is today so typical in engineering accomplishment of our great West.

JOHN D. RYAN, president of the Montana Power Company, Butte, Montana, and Chief of Air Craft Production.



When it became known throughout the industrial world that the man who had dreamed the dream of trans-continental railway electrification and made good in actual demonstration, was to assume control of aircraft production, immediately throughout all allied activities a certain sense of hope and relief was felt in all quarters. Mr. Ryan has demonstrated to the world that the great electrical industry

of the country has in fact attracted to it, as stated by Commissioner Edgerton at the recent Coronado convention, the brightest brains of the nation.

D. C. JACKLING, president of the Utah Power and Light Company, and chief of copper production for the Federal authorities. Like John D. Ryan, Mr. Jackling proved to the nation that the utility executive organization has the constructive vision to see things in their proper perspective, and under his magnificent vision the world's production of copper responded with vast increases in output and economy of production. The history of the phenomenal increases in the production of our minerals is one of the romances of figures and a typical instance of the magnificent response of which the country proved itself capable.



MARK L. REQUA, consulting engineer of San Francisco, national fuel oil administrator. Fuel oil in its power generating characteristics proved a matter of prime importance on land and sea during the momentous days of the war. To the excellent administrative ability of Mr. Requa in increasing our oil supply and conserving its use to the highest possible development the nation must ever owe a debt of gratitude. Mr. Requa's service is an example of the wise principle adopted by the government in this war of appointing experts in administrative positions—a fact which has served to bring the engineer so much to the front.



Meeting Notices for Electrical Men

(Important announcements of the committees and future plans of the National Electric Light Association are the feature of organization events during the past two weeks. Inter-mountain associations have been active, and engineering societies, local and national, report important gatherings. Promising plans for the Northwest Electric Light and Power Association's convention are now under way.—The Editor.)

American Association for the Advancement of Science

The Pacific Division of the American Association for the Advancement of Science met recently in a three-day session at the Throop College of Technology, Pasadena, Cal. Among the subjects discussed were the part science played in the winning of the world war; also plans for the exploration of the North Pacific Ocean. The Pacific Division numbers about 1500 members.

Colorado Electric Light, Power and Railway Association

The Colorado Electric Light, Power and Railway Association will hold its annual convention at Glenwood Springs on September 18-19-20. Plans are being developed that will make the convention one long to be remembered.

Oregon Society of Engineers

The Oregon Society of Engineers held a house warming on June 27 by way of taking possession of their new club quarters at 408 Tilford Building, Portland. There was a brief business session at which the amendment to the constitution relating to amalgamation with the American Association of Engineers was taken up. The rest of the meeting was in the nature of a get-acquainted gathering.

National Electric Light Association

President R. H. Ballard of the National Electric Light Association, in appointing the National Public Policy Committee to serve for the year beginning July 1, 1919, has brought the direction of this most important committee of the Association to the Pacific Coast, as with the concurrence of other members of the committee, he has appointed John A. Britton, of San Francisco, chairman.

Mr. Britton is vice-president and general manager of the Pacific Gas & Electric Company, a Regent of the University of California, and one of California's most prominent citizens. He is affectionately known among electrical men as the Dean of the Electrical Industry on the Pacific Coast. Mr. Britton has been prominently identified with public utility companies in California for more than forty years.

To facilitate the work of the committee, W. W. Freeman, of Cincinnati, who for several years has been chairman of the committee, has consented to act as vice-chairman for this year, and will attend to matters that may develop in the East.

S. Z. Mitchell of New York, president of the Electric Bond & Share Company, has been added as a new member of the committee. The great organization of which Mr. Mitchell is head is interested in electric properties located all over the

United States, and he therefore helps to represent the financial branch of the electrical industry.

The committee is as follows:

Chairman—John A. Britton, San Francisco
Vice-Chairman—W. W. Freeman, Cincinnati

N. F. Brady, New York
H. G. Bradley, Boston
Henry L. Doherty, New York
Samuel Insull, Chicago
Jos. B. McCall, Philadelphia
S. Z. Mitchell, New York

E. W. Burdett, Boston
Walter Clerk, Philadelphia
Chas. L. Edgar, Boston
John W. Lieb, New York
Thos. E. Murray, New York
H. A. Wagner, Baltimore

R. H. Ballard, Los Angeles (ex-officio)

American Society of Civil Engineers

The American Society of Civil Engineers held a successful convention at Minneapolis, Minn., during the third week in June. Engineers from all parts of the country were present to exchange ideas on current questions. The reorganization of the society along more democratic lines was discussed, though no definite action was taken. A trip to Duluth was among the enjoyable features of the convention.

Mechanical Railway Conventions

At the mechanical railway conventions held at Atlantic City during June there was also held the largest exhibition of railway supplies and equipment ever brought together. A large number of railway officials and railway supply manufacturers gathered for discussion of transportation problems, and to show the railway appliances that play so large a part in the solution of these problems.

American Engineering Corporation

At the conference of delegates from engineering,

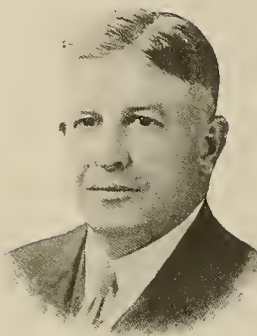
architectural and related organizations from all over the United States, held in Chicago in April, the following resolution relating to topographic mapping of the United States was unanimously passed:

"The Engineers, Architects, and Constructors' Conference on National Public Works, composed of the representatives appointed by 74 National, State and Local Organizations, with an aggregate membership of over 100,000 men, realizes the great importance of adequate maps for the economical planning and construction of a large proportion of engineering works.

"With much wisdom the Federal and State Governments are now entering upon a program of highway construction which constitutes the greatest engineering project ever undertaken by our Government, and which will result in the expenditure of many billions of dollars of public funds in the next decade. This highway construction, as well as many other important public and private engineering undertakings, such as drainage and reclamation projects and others—in the aggregate of tremendous magnitude—demand for economical accomplishment of the best type of information such as is afforded by the Topographic Maps issued by the Federal Government in cooperation with many of the States. These maps are completed for only about 40% of the area of the country. The past rate of progress, if continued, will require between 80 and 100 years to complete the maps for the whole United States.

"It is apparent to this Conference that by having such maps the saving in the cost of engineering works to be constructed during a very small portion of this time will more than pay for the making of these

BUILDERS OF THE WEST — LVII



WYNN MEREDITH

Along with the splendid vision of adventure and daring that has made possible the establishment of so many world records in engineering achievement throughout the West, there has ever been a sane and sound business judgment among our engineers that has made these projects prove profitable and going institutions of helpfulness to the nation. To Wynn Meredith, Pacific Coast representative of Sanderson & Porter, engineers of New York and Chicago, this issue of the Journal of Electricity is affectionately dedicated as a lasting memorial to his genius in design and construction in the West—a design and construction worthy of emulation by the highest type of engineering thought and endeavor.

maps. Therefore, it will be greatly to the public advantage if the completion of these maps can be hastened as rapidly as men can be trained to do the accurate work required.

"In view of the foregoing statements, which express the sense of this Conference,—

"Be It Resolved: That the facts be presented to the President and to the Congress, and that they be urged to make adequate provision for the entire work of completing the Topographic Maps of the United States in the shortest possible time, compatible with requisite accuracy; and

"Be It Further Resolved: That inasmuch as Engineering Council has already taken up this matter with Federal Government Departments, their efforts to hasten the completion of the Topographic Maps be endorsed by this Conference and that this Resolution be entrusted to them to present to the President, the Secretary of the Interior, the members of the Congress, and to make such other dispositions of it as will, in their judgment, further the end desired."

Denver Electrical Contractors' Association

At a recent meeting of the Denver Electrical Contractors' Association the following officers were elected: E. C. Headrick, president; J. Fischer, vice-president; R. S. Willoughby, treasurer; C. N. Shannon, secretary. The organization holds meetings on the second and fourth Monday nights of each month, and has headquarters at 227 Coronado Building.

Western Conference of N. E. L. A.

On July 9th a conference of representatives of leading Pacific Coast electrical interests met in the office of John A. Britton, general manager of the Pacific Gas & Electric Company, San Francisco. Those present were as follows:

R. H. Ballard, first vice-president of Southern California Edison Company, Los Angeles, and president of the National Electric Light Association; John A. Britton, Pacific Gas & Electric Company; P. A. Bertrand, manager of Gray's Harbor Light & Power Company, Aberdeen, Wash.; J. B. Black, commercial agent, Great Western Power Company, San Francisco; N. W. Brockett, Puget Sound Traction, Light & Power Company, Seattle; E. A. Batwell, publicity agent, Puget Sound Traction, Light & Power Company; E. R. Davis, Southern California Electric Company, Los Angeles; N. A. Bowers, McGraw-Hill Publishing Company; Henry Bostwick, manager of Pacific Gas & Electric Company; Samuel Kahn, vice-president and general manager of Western States Gas & Electric Company, Stockton; H. J. Gille, commercial manager, Puget Sound Traction, Light & Power Company; A. H. Halloran and Robert Sibley of the Journal of Electricity; H. F. Jackson, president of Sierra and San Francisco Power Company; R. S. Masson, president of Arizona Power Company, Prescott, Ariz.; L. H. Newbert, commercial manager of Pacific Gas & Electric Company; F. J. Somers, Century Electric Company, San Jose; C. C. Hillis, Electric Appliance Company; A. E. Wishon and A. G. Wishon, San Joaquin Light & Power Corporation, Fresno.

With President R. H. Ballard in the chair the conference discussed the policies of the National Electric Light Association for the coming year, and a number of constructive plans were taken up.

Arrangements for the annual conference scheduled to take place in Los Angeles next May were discussed, and several reports presented. The National Association is aiming

at greater decentralization, and with increased localization of effort expects to put in a very effective and active year of work.

Colorado Engineering Council

The purpose of the recently organized Colorado Engineering Council is "to coordinate the work of various technical, scientific and engineering organizations, promote the welfare and professional standing of their members, and foster a more general recognition of the engineer in civic matters."

The membership consists of local associations of members of the national engineering societies, and other local engineering, scientific or technical associations, each of which is entitled to a seat in the Council. The officers are: Arthur Ridgway, president; L. G. Carpenter, vice-president; Robert J. Grant, secretary-treasurer.

A. S. M. E., San Francisco

The San Francisco Section of the American Society of Mechanical Engineers held a luncheon on July 3rd in honor of Professor W. F. Durand of Stanford University, the newly elected Section chairman, and seventeen new members of the San Francisco Section. E. C. Jones, the retiring chairman, and nominee for the vice-presidency of the national association, presided at the meeting, which was devoted to enthusiastic discussion of plans for the coming year.

The Northwest Electric Light and Power Association will hold its convention in Seattle on Sept. 10th, 11th and 12th. As this gathering is one of the most important events of the year for western electrical men, a very large attendance is expected. To accommodate those coming from the vicinity of San Francisco, arrangements are being made for a special car, and all planning to attend should notify W. M. Deming, President and General Manager of the Technical Publishing Company, 171 Second street, San Francisco.

The success which has always characterized the Association's conventions in the past, as well as the extremely interesting program which is being arranged for this occasion, are sufficient to insure an enthusiastic attendance.

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers

President—Calvert Townley, Westinghouse Electric & Manufacturing Company.
Secretary—F. L. Hutchinson, Engineering Society Bldg., New York City.
Meetings—Monthly.

Los Angeles Section

Chairman—J. H. Cunningham, General Electric Co., Los Angeles.
Secretary—Clem A. Copeland, Bureau of Power and Light, Los Angeles.
Meetings—Second Tuesday of each month.

Portland Section

Chairman—W. D. Scott, Pacific Telephone & Telegraph Company, Portland, Ore.
Secretary—E. H. LeTourneau, Portland Railway, Light & Power Company, Portland, Ore.
Meetings—Monthly.

Denver Section

Chairman—Prof. H. S. Evans, Univ. of Colorado, Boulder.
Secretary—Robt. B. Bonney, Mountain States Tel. & Tel. Co., Denver, Colo.

Meetings—Third Saturday of each month, at the Shirley Hotel.

San Francisco Section

Chairman—J. C. Clark, Stanford University, Cal.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings—Fourth Friday each month—Engineers' Club, 7 p.m.

Seattle Section

Chairman—John Harisberger, 4015—4th Ave. N. E., Seattle, Wash.
Secretary—T. C. Smith, City Lighting Department, Seattle, Wash.
Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.

Spokane Section

Chairman—George Nixon, Main and Lincoln Sts., Spokane.
Secretary—G. H. Hoppin, 1128 W. Kiernan Ave., Spokane.
Meetings—Third Friday of each month.

Utah Section

Chairman—A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
Secretary—H. T. Plumb, 183 U St., Salt Lake City, Utah.
Meetings—Third Wednesday of alternate months, 8 o'clock. Assembly Room of Commercial Club, Salt Lake City.

Vancouver Section

Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch

Chairman—A. E. McMahon, University of California, Berkeley, Cal.
Secretary—D. D. Davis, University of California, Berkeley, Cal.

University of Colorado Branch

Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

Idaho University Branch

Meetings—First Wednesday evening of each month from October to June.

Oregon Agricultural College Branch

Chairman—Lawrence Fudge, Oregon Agr. College, Corvallis, Ore.
Secretary—Otto L. Cantrall, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch**Montana State College Branch**

Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.
Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Throop College of Technology Branch

Chairman—Mark Sawyer, Throop Dormitory, Pasadena, Cal.
Secretary—Russell Otis, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch

Chairman—Clarence E. Guse, Pullman.
Secretary—Ralph C. Guse, State College of Washington, Pullman.
Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS**National Association of Electrical Contractors and Dealers**

Chairman—W. Creighton Peet.
Secretary—W. H. Morton, 110 West 40th St., New York.
Executive Committeemen, Pacific Division—J. R. Tomlinson, Portland, J. F. NePage, Seattle, Wash.

Electrical Contractors & Dealers of Salt Lake City

President—G. W. Forsberg.
Secretary—E. H. Eardley, Eardley Bros., Salt Lake City.

British Columbia Ass'n Electrical Contractors and Dealers

President—E. Brettell, Vancouver, B. C.
Secretary—Capt. W. J. Conway, Vancouver, B. C.
Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers

President—C. L. Chamblin, 180 Jessie St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Monthly.

Denver Electrical Contractors' Association

President—E. C. Headrick.
Secretary—C. N. Shannon.
Meetings—2nd and 4th Monday nights of each month.

Electrical Contractors and Dealers Ass'n of San Francisco

President—C. L. Chamblin, 641 Mission St., San Francisco.
Secretary—J. Stewart, San Francisco.
Meetings—Saturday 12:30: The States.

Southern California Electrical Contractors and Dealers

President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.
Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.
Meetings—Every Friday at 5:30 p.m. at the Pin Ton Cafe, 427 South Broadway.

Monterey Bay Electrical Contractors and Dealers

President—W. Cox, Santa Cruz.

Secretary—D. K. Noggle, Monterey.

Nevada Ass'n of Electrical Contractors and Dealers

President—F. V. McAvoy, 138 N. Canter St., Reno.
Secretary—R. W. Shearer, 215 Sierra St., Reno.
Meetings—Twice a month, 15th and 30th.

Oregon State Ass'n of Electrical Contractors and Dealers

President—R. C. Kenney, 388 Burnside street, Portland.
Secretary—J. Willis Oberender, 209-10 McKay Bldg., Portland, Ore.

Portland Local Ass'n of Electrical Contractors and Dealers

President—Roy C. Kenney, Portland.
Secretary—J. W. Oberender, 209-10 McKay Bldg., Portland.
Meetings—Alternate Mondays at Imperial Hotel Grill.

Sacramento Section, California Electrical Contractors & Dealers' Association

President—W. H. Gribble, Sacramento.
Secretary—H. Berg, Sacramento.

Washington Ass'n of Electrical Contractors and Dealers

President—V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.
Secretary—Forrest E. Smith, Seattle, Wash.
Meetings—Quarterly—second Thursdays of March, June, September and December.

JOBBER'S ASSOCIATIONS

Electrical Supply Jobbers Association
General Secretary—Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.
Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers

President—W. S. Berry, Western Electric Company, San Francisco.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings—Quarterly.

Electrical Credit Ass'n of the Pacific Coast
President—C. L. Gilson, Gilson Electrical Supply Co., 304-12th St., Oakland, Cal.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.

Meetings—annually; San Francisco; May.

OF ELECTRICAL INTEREST**California Electrical Cooperative Campaign**

Chairman Advisory Committee—L. H. Newbert, 445 Sutter St., San Francisco.
Secretary—R. M. Alvord, Rialto Bldg., San Francisco.

Colorado Electric Light, Power and Railway Association

President—E. A. Phinney, Jefferson Co. Power & Light Co.
Secretary-Treasurer—F. P. Safford, Denver Gas & Electric Co., Denver, Colo.

National Electric Light Association

President—R. H. Ballard, Southern California Edison Company.
Secretary—A. H. Halloran, Journal of Electricity.

Nevada Section, N. E. L. A.

Chairman—Geo. A. Campbell, Reno, Nev.

Pacific Coast Section, N. E. L. A.

President—A. E. Wishon, San Joaquin Light & Power Corporation, Fresno, Cal.
Secretary—A. H. Halloran, Journal of Electricity, Electric Bldg., San Francisco.
Meetings—Annually, in April.

Portland Section, N. E. L. A.

Chairman—F. H. Murphy, Portland Railway, Light & Power Company.
Secretary—Geo. Bowen, Portland, Ore.

Illuminating Engineering Society

President—S. E. Doane.
Secretary—Clarence L. Law.
Western Representatives—Romaine Myers, Bacon Bldg., Oakland, Cal.; C. M. Masson, Edison Bldg., Los Angeles; F. H. Murphy, Portland Railway Light & Power Company, Portland, Ore.; W. R. Putnam, Utah Power & Light Company, Salt Lake City; Fred A. Osborn, University of Washington, Seattle, Wash.
Meetings—First Tuesday each month.

New Mexico Electrical Association

President—D. W. Morgan, Las Cruces, N. M.
Secretary—Charles Twogood, Albuquerque, N.M.
Meetings—Annually, in February.

Southwestern Electrical and Gas Association

President—W. A. Sullivan, Shreveport, La.
Secretary—H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Northwest Electric Light and Power Ass'n

President—H. J. Gille, Puget Sound Traction Light & Power Co.
Secretary—W. E. Herring, Puget Sound Traction, Light & Power Co.
Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.

Los Angeles Jovian Electrical League

President—A. E. Peat, San Joaquin Light & Power Corp.
Secretary—Frank Weiss, Los Angeles Gas & Electric Corp.
Meetings—Every Wednesday, 12 m.

San Francisco Electrical Development League

President—Garnett Young, 612 Howard St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Every Monday, 12:10 p.m.; luncheon, Palace Hotel.

Electric Metermen's Association

President—J. E. Bridges, Westinghouse Electric & Manufacturing Company.
Secretary—A. E. Coney, Great Western Power Company, San Francisco.
Meetings—About every 60 days.

Alameda County Electrical Club

President—George Drew, Pacific States Electric Company, Oakland, Cal.
Secretary—George B. Furniss, Pacific Gas & Electric Company, Oakland, Cal.

Synchronous Club

Secretary—H. N. Beecher, City Hall, Los Angeles.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section

President—W. H. Brommage, Pacific Tel. & Tel. Co., San Francisco.
Secretary—Chas. H. Dobson, 835 Howard St., San Francisco.

MECHANICAL ENGINEERS**National Officers**

President—Mortimer E. Cooley, Electrical Engineering Dept., Ann Arbor, Mich.
Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.
San Francisco Section, A. S. M. E.
President—W. F. Durand, Stanford University, Palo Alto, Cal.
Secretary—Geo. L. Hurst, Bethlehem Ship Bldg. Corp., Ltd., San Francisco.
Meetings—Quarterly.
Thursday lunches have been arranged at the Engineers' Club, 57 Post St.
Los Angeles Section, A. S. M. E.
President—Charles H. McGuire.
Secretary—T. J. Royer.
Meetings—Quarterly.

ENGINEERS' CLUBS

Oregon Society of Engineers
President—John W. Cunningham, 414 Spalding Bldg., Portland.

Secretary—Orrin E. Stanley, Box 973, Portland.
Meetings—Annual: First Monday in February.
Monthly: Third Thursday of each month.
Third Thursday of each month.

The Engineers' Club of Seattle

President—H. E. Horrocks, Seattle, Wash.
Secretary—E. J. Bartels, Northern Life Bldg., Seattle, Wash.
Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco

President—A. E. Chandler, New Call Bldg., San Francisco.
Secretary—J. R. Brownell, 525 Market St., San Francisco.

Annual Meeting: October.

Idaho Society of Engineers

President—W. H. Gibson, Mountain Home, Idaho.

Secretary—Ira F. Shaffner, Boise, Idaho.

Engineers' Club of Oakland

President—R. S. Chew, Oakland Chamber of Commerce, Oakland.

Engineers' Club of Sacramento

President—George S. Nickerson, 914 Forum Bldg., Sacramento.

Secretary—P. M. Noeboe, State Department of Engineering, Forum Bldg., Sacramento.

Colorado Engineering Council

President—Arthur Ridgway, 810 Equitable Bldg., Denver.

Secretary-Treasurer—Robert J. Grant, 614 Interstate Trust Bldg., Denver.

United Engineering Societies of San Francisco

Chairman—C. D. Marx, Stanford University.

Secretary—Nathan Bowers, Rialto Bldg., San Francisco.

Joint Committee Technical Societies of Los Angeles

Chairman—George A. Damon.

Secretary—W. K. Barnard, 705-6 Central Bldg., Los Angeles.

Utah Society of Engineers

President—Leonard Cahoon.

Secretary—Wm. H. Kelsey.

Meetings—3rd Wednesdays except May, June, July and August.

Annual banquet—May.

MISCELLANEOUS**American Ass'n for the Advancement of Science—Pacific Division**

President—John Cammell Merriam, University of California; Acting Chairman National Council of Research.

Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.

Meetings—Annual.

Portland Section A. S. C. E.

President—P. H. Dater, Eng. U. S. Forestry Service.

Secretary—C. P. Keyser, Park Bureau, Portland, Oregon.

Meetings—At call of president.

Spokane Engineering & Technical Ass'n

President—L. K. Armstrong, A. S. M. E.

Secretary—A. D. Butler, City Engineer, Spokane, Wash.

Meetings—Third Friday of each month. Joint with A. S. C. E., A. I. E. E. and A. S. M. E.

Foreign Trade Club

President—W. H. Hammer, Monadnock Bldg.

Secretary—Wm. E. Hague, Monadnock Bldg.

Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.

Pacific Coast Gas Association

President—John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.

Secretary—Henry Bostwick, 445 Sutter St., San Francisco.

Society for Promotion of Engineering Education

Secretary—F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

Los Angeles Transportation Association

President—C. G. Krueger, 324 S. Broadway, Los Angeles.

Secretary—D. W. Ferguson, 324 S. Broadway, Los Angeles.

HAPPENINGS IN THE INDUSTRY

NATIONAL ENGINEERING DEPARTMENT

Far reaching changes in the executive machinery of the federal government are proposed in the bill recently introduced in Congress. The federal Department of the Interior will become the Department of Public Works, if the legislation proposed is enacted. The main idea is to assemble all engineering activities of the government in one department.

Such bureaus of the Interior Department as are non-engineering in character are to be placed under the jurisdiction of appropriate departments, while engineering bureaus from other departments are to be included in the Department of Public Works. The bill proposes that the Patent Office is to be removed from the Interior Department and placed under the Department Commerce. The Bureau of Pensions is assigned to the Department of the Treasury. The Bureau of Education goes to the Labor Department. The Bureau of Indian Affairs also is transferred to the Department of Labor, with the proviso that the engineering and construction work and the land and mineral surveys now performed under the direction of the Bureau of Indian Affairs are to be prosecuted under the Department of Public Works.

On the other hand, the Department of Public Works is slated to absorb the Supervising Architect's Office of the Treasury Department; the Construction Division, River and Harbor Improvements, Mississippi River Commission, and California Debris Commission of the War Department; the Bureau of Standards and the Coast and Geodetic Survey of the Department of Commerce; the Bureau of Public Roads and the Forest Service of the Department of Agriculture.

The bill provides that the Secretary of Public Works "shall by training and experience be qualified to administer the affairs of the Department and to evaluate the technical principles and operations involved in the work thereof." The measure excepts from the foregoing provision the Cabinet officer who is at the head of the Department at the time of the passage of the bill.

Four Assistant Secretaries, each to be paid \$7,500 per annum, are provided and their duties outlined. One Assistant Secretary is to have administrative jurisdiction over all matters of engineering design and construction. Another is to have charge of architectural design and construction. The third is to have jurisdiction over all scientific work and surveys, while the fourth Assistant Secretary is to be in immediate charge of all land and legal matters. The Assistant Secretaries are charged with the duty of coordinating and bringing into efficient relationship all the activities of the department so that it may be harmoniously and efficiently administered.

An important feature of the bill is the proviso, that the officers of the U. S. Army detailed on non-military work are to be assigned by the Secretary of War to like duties under the new department, for not over two years. This enables the Secretary of Public Works to make gradual transfer of improvements and instrumentalities to civil administration without detriment to public interest. Members of the Corps of Engineers may, under the direction of the Secretary of Public Works, be detailed by the Secretary of War to temporary duty in the new department for such instruction, training and experience as is desired.

The bill was introduced in the upper House by Senator Wesley L. Jones, of Washington, and in the lower House by Representative Frank C. Reavis of Nebraska.

REVISIONS IN THE NATIONAL ELECTRICAL CODE

Motors and Motor Fuses —

Several questions on motors and motor fuse protection are under consideration by the Electrical Committee of the National Fire Protection Association in its work of preparation for the 1920 edition of the National Electrical Code. The investigations are being conducted by the Standing Committee on Industrial Applications, under whose direction several technical sub-committees have been appointed.

Among the topics receiving attention are the following:

The general question of the size, location and installation of fuses designed for the protection of motors and their starting devices as distinguished from other fuses primarily intended to protect the main or branch feeders. It is expected that more definite and readily applicable rules can be formulated on this very important matter (N. E. Code Rule 8).

Present rules limit quite closely the use of oil filled transformers in industrial applications in buildings and this subject is again being reviewed. (N. E. Code Rules 11 and 36.)

A clarification of the rules on the installation of starting devices is proposed, especially as regards distinctions between direct and alternating-current apparatus and the disconnecting switches now called for with autostarters or compensators (Rules 8-c and 8-d).

It is possible that some provision can be made to permit the application of a demand factor in certain types of motor driven equipments which will reduce in a specified manner the necessity of running supply circuits of the larger current-carrying capacity now required by a rigid interpretation of present rules.

Other questions are those of fireproof motor rooms or enclosures and the grounding of motor and generator frames.

Persons having suggestions or recommendations on the Code rules covering these topics are invited to communicate with Mr. G. S. Lawler, chairman of the Standing Committee on Industrial Applications, 31 Milk street, Boston, Mass.

Electric Railroad Cars —

The Standing Committee of the Electrical Committee of the National Fire Protection Association on Cars and Railways has under consideration the revision of the requirements of the National Electrical Code on Wiring of Car Houses and the Equipment of Cars.

In addition to a review of the present rules attention will be given to the question of formulating rules applicable to railway systems and cars operating at voltages from 600 to 1500 volts.

In this work are cooperating two special committees of the American Electric Railway Engineering Association.

Any one having suggestions or recommendations on the Code rules covering these subjects is invited to communicate with the chairman of the Standing Committee, Mr. Martin Schreiber, Public Service Railway Company, Newark, N. J.

LINE CONNECTION

The Pacific Power & Light Company have completed and tested a connection between their 66,000 volt line from Pasco to Lind, at Lind, and the Intermountain Power Company's line from Long Lake to Taunton. An outdoor type of substation was built equipped with 3—3000 kva. oil cooled Radiator Type G-E Transformers, 110,000 to 69,000 volts. Pacific Electric Company's oil switches were used.

GOVERNMENT CLERICAL POSITIONS

The Government is urgently in need of large numbers of stenographers, typists and bookkeepers in Washington, D. C. The usual entrance salaries are as follows: stenographers \$1,200, typists \$1,100, bookkeepers \$1,100 and \$1,200 a year. There are also temporary bonuses, and higher salaried positions are usually filled through promotion.

A list of available accommodation in private houses in Washington is maintained by the Government.

Full information may be obtained from the Secretary of the Local Board of Civil Service Examiners at the post office or custom house in any city.

GENERAL LIGHTING SAFETY ORDER

There have been two hearings relative to the General Lighting Safety Orders issued by the Industrial Accident Commission, one in San Francisco and one in Los Angeles. The matter after being referred back to the committee for final consideration, goes finally to the Commission for approval and then to the State Printer. The orders will go into effect very shortly.

VICTORY LOAN RETURNS

According to the official figures recently announced by the Federal Reserve Bank, San Francisco subscribed to the Victory Loan \$79,671,550 as against a quota of \$79,318,150, with a total of 143,841 subscriptions. Los Angeles, with a quota of \$31,848,900, subscribed \$33,078,250, with a total of 108,558 subscriptions.

The complete figures for the Twelfth Federal Reserve District show a subscription of \$319,675,150, for a quota of \$301,500,000. The four German cannon to be awarded in the district go to Portland, Oakland, Santa Barbara and the State of Washington.

WATER POWER BILL PASSED

The Administration's power bill, as passed in the House recently, is substantially as reported from committee. It provides for the lease to states, municipalities or corporations water power sites on navigable rivers, public lands and public reserves for a period not to exceed fifty years. Representative Raker of California demanded a separate vote on an amendment to the bill providing for the repeal of the provision of the rivers and harbors act creating a commission to investigate the water resources of the country. The amendment was carried by a vote of 132 to 8.

NEW WASHINGTON SAFETY BOARD

Announcement is made of the personnel of the new Washington State Safety Board, by Dr. K. S. Kloeber of Olympia, chairman of the board. The appointments are:

District Board No. 1, headquarters in Spokane—J. J. Kennedy, member of the Spokane typographical, and F. A. Ross, mining engineer of Spokane.

District Board No. 2, headquarters in Seattle—A. L. Valentine, Seattle, former superintendent of public utilities, and Robert P. Duncan, nominated by the state federation of labor.

District Board No. 3, headquarters in Tacoma—V. T. Evans, of Aberdeen, editor of a daily labor paper, and T. H. Henry, Tacoma, who has been active in safety work for the Tacoma Traction & Power Company.

Ross, Valentine and Henry were nominated by employers of their respective districts and Kennedy, Duncan and Evans by the labor interests.

Dr. Kloeber announces that a sub-office under the Spokane office will be established in Cle Elum with a secretary in charge.

It is also announced that John W. Pace, secretary of the Washington State Fair Commission, has accepted the secretaryship of the State Safety Commission.

A NEW PLANT

The Hurley Machine Company have broken ground at Chicago for a new factory, in addition to their present plant. The new building is to be devoted exclusively to the manufacture of Thor washing machines. This will give a capacity of 300 machines a day.

DEVELOPMENT IN SPAIN

An order has been placed with the Electric Furnace Construction Company, Finance Building, Philadelphia, for an electric furnace for the manufacture of ferro-alloys for Spain, by the Sociedad de Construcción Naval, the Advisory Committee of which consists of the firms of Sir W. G. Armstrong Whitworth & Company, Vickers, Ltd., and John Brown & Co. This is the first furnace of its kind to be erected in Spain for converting their own natural ores into ferro-alloys.

NEW NORTHWESTERN PLANT

A five-acre tract east of the city was purchased by the International Steel Company of Spokane, Wash., preparatory to the erection of a \$100,000 steel plant on the ground. The site is on the Milwaukee Railroad. The plant will be of the familiar type of steel rolling mill and will be built soon. The factory will be equipped with electric furnaces.

COLORADO POWER LINES

Julesburg, Colo., will supply power from its municipal plant to Sedgwick, which will build a 15-mile transmission line from the outskirts of Julesburg, and the distribution lines in Sedgwick. The construction will be done by the Henningson Engineering Company of Omaha, Neb.

NEW ELECTRIC LIGHTING PLANT

A new electric lighting plant has just been contracted for Lusk, Wyoming. The installation will consist of two 400 kw. G-E generators. The new plant is required by the rapid growth of the city which is in the heart of the new oil district.

WAR DEPARTMENT EMPLOYMENT SERVICE

The following is an extract from a letter sent out by the War Department in connection with the finding of employment for discharged soldiers:

All over the United States the War Department is securing the hearty cooperation of all the welfare services, chambers of commerce, labor unions, employers' associations, and many national, state, and civic bodies, all of whom are at liberty to use the machinery of the U. S. Employment Service towards hooking up the discharged men of the army and navy with a good job.

There are registered with us at our main office in Washington, D. C., the names of a number of honorably discharged officers who served in France and elsewhere and who have applied to us for assistance in securing proper employment fitted to their capacities. On this list are a number of experts and technicians of all kinds, many of them with years of experience. All of them have handled men in the field under the most trying conditions and therefore could be depended upon in these more peaceful days better to perform such duties. Practically all professions and trades are included, and I am writing to ask if employers in your branch of industry will not survey their own field in order to ascertain whether or not they may have present need for some such men as I mention.

A word by mail to the office of the Assistant Secretary of War will result in a selection of names best suited for the opportunity in hand, taken from the carefully classified files of the War Department.

CALIFORNIA INDUSTRIES AND LAND SHOW

At the California Industries and Land Show, to be held at the Exposition Auditorium, October 4 to 19, under the auspices of the Home Industry League, a plan simulating a model house, with drawing rooms, dens, boudoirs, dining room and the most modernly equipped kitchens, will be utilized for the setting of the fashion reviews planned by the Fashion Committee.

It is anticipated that the exhibits in this model California home will run the gamut of household equipment from California hams to original and artistic furniture, and that the latest in up-to-date electrical appliances for the home will be prominent among the model features.

The model house is to occupy one end of the Exposition Auditorium and will cover a large space. It promises to be one of the great attractions of the exhibition.

The chairman of the committee in charge of the California Industries and Land Show is Frank D. Fagan, sales-manager of the Edison Lamp Works, Oakland.

ENGINEERS AND EMPLOYMENT OF EX-SOLDIERS

To aid in the work of re-employment for discharged soldiers, sailors and marines the engineering societies of the United States have organized the "Engineering Council and the Engineering Societies Employment Bureau."

The Society of Engineers, Society of Mechanical Engineers, Institute of Mining and Institute of Electrical Engineers have all volunteered to help.

Captain Wemple, director of the western district under Colonel Arthur Woods, has headquarters at 809 Flood Building, San Francisco.

TRADE NOTES

Lighting Contract —

The Stockton division of the Western States Gas & Electric Company has been awarded a five-year contract for the lighting of a Stockton suburb with twenty-six 600 candle-power gas filled series lamps.

New Business —

Pittsburgh Piping & Equipment Company are furnishing the piping for the new boiler installation of the Pacific Gas & Electric Company at Station A, San Francisco.

The Acme Electric Company of 420 Union street, Seattle, has been awarded a contract for wiring in the four-story warehouse of the American Grocery Company. The company has just completed the job of installing 15 motors and 150 lights in the Pacific Oil Mills Company plant on Marginal Way.

For the Electrical Industry —

The Trumbull Electric Manufacturing Company of 595 Mission street, San Francisco, have designed a small watch fob and a screw driver which they are distributing to the trade.

Business Announcement —

Railway and Industrial Engineers, Incorporated, of 25 Broad Street, New York City, has associated with it an experienced and competent staff of experts thoroughly familiar with domestic and foreign methods and practices, and offers to bankers, corporations and others its services in a representative, advisory, consulting or administrative capacity.

THE PRICE REVOLUTION

The following extracts are from the paper by Irving Fisher, Professor of Political Economy, Yale University, which was read before the Conference of Governors and Mayors at the White House, March 3, 4 and 5, 1919:

Stalled Business —

At the present time there is a marked halt in production. Industry is slowing down. Unemployment of labor increases. Some industrial concerns are failing to earn profits, and others are suffering the dissipation of their accrued profits, because, even by shutting their plants down, they can not save certain of their expenses or any of their fixed charges. The government's revenues, dependent as they are upon the national income, may fall short at the very time we need them most. In brief, we are threatened with a widespread business depression and from peculiar causes, for the unsound conditions usually preceding a wide-spread business depression are absent.

The main reason why business is not going ahead better is that most people expect prices to drop. The merchant is selling, but not buying. The manufacturer holds up the purchase of his raw materials. People quote the disparity between present prices and those prevailing "before the war," and decide that they will not buy much until present prices get down to "normal." This general conviction that prices are sure to drop is putting a brake upon the entire machinery of production and distribution. Readjustment waits because we keep on waiting for it. We have waited in vain for over three months. It is interesting to observe that many manufacturers think that prices must come down, including the

price of labor; but they are ready to demonstrate to you that their own prices can not come down, nor can they pay lower wages.

The General Price Level —

Now, as a matter of fact, when we investigate almost any individual one of the so-called high prices for industrial products we are likely to find that individually it is not high; that is, it is not high relatively to the rest. Our quarrel is with the general level of prices. Variations in the general price level may be compared to the tides of the sea, while individual prices may be compared to waves. Individual prices may vary from this general level of prices for specific reasons peculiar to individual industries, just as the height and depth of waves vary from the general level established by the tide. The causes controlling the general price level are as distinct from those controlling individual prices as the causes controlling the tides are distinct from those controlling individual waves.

All prices have risen, but some have risen more, some less, than the average for particular reasons affecting each industry. In some cases an improved organization of both employers and employees has enabled them to combine against the public and take full advantage of the price advance. The war brought about an abnormal demand for certain products like copper and steel, and they advanced faster than the average. The abnormal demand having disappeared, these prices are being adjusted downward. In some cases, as in many of the industries making building materials, the war meant a great slackening in demand, and an enforced curtailment in use by government order. In such instances we are likely to see an upward swing in prices as the suppressed demand again makes itself felt. Today we are witnessing throughout the country price readjustments, up and down, but the general price level has shown little sign of falling, as is evidenced by price index numbers. It is apparent to every thoughtful observer that some great force has affected all prices, creating a new standard to which they are all conforming.

European Prices Have Risen More than Ours —

At the present time European goods are not "low priced" (however little the money wages the European labor will buy). Prices in Europe since the war began have risen more than they have in the United States. The price rise has been less the farther from the seat of hostilities. It was least in Australia and New Zealand. It was next least in the United States, Canada, and Japan. Then came neutral Europe; then our present allies; and finally Germany and Russia. Gold tends usually to flow from high-priced countries to low-priced countries, so that until "inflated" European prices fall gold is not likely to flow thither. Prices are no more likely to fall there than here.

Go Ahead on the New Price Level —

The fundamental practical question confronting business men is whether the general level of prices is going to fall. In my opinion, it is not going to fall much, if at all. We are on a permanently higher price level, and the sooner the business men of the country take this view and adjust themselves to it, the sooner will they save themselves and the nation from the misfortune which will come if we persist in our present false hope.

Business men should face the facts. To talk reverently of 1913-14 prices is to speak a dead language today. The buyers of the country, since the armistice, have made an unexampled attack on prices through their waiting attitude, and yet price recessions have been insignificant. The reason is that we are on a new price-level, which will be found a stubborn reality. Business men are going to find out that the clever man is not the man who waits, but the one who finds out the new price facts and acts accordingly.

LATEST IN EVERYTHING ELECTRICAL

(New and improved devices presented in this industrial review include an ampere meter for use in the operation of storage battery trucks, tractors, etc.; a renewable fuse with special safety features; a vacuum cleaner with numerous improvements; an electric warming pad, a bar bender with easy adjustment, and a new type of engine.—The Editor.)

NEW MODEL VACUUM CLEANER

After extensive experiments with various types of bristle brush for vacuum cleaners, the Clements Manufacturing Company of Chicago has reverted to the carpet sweeper brush, which is found to be the most efficient for picking up

makes for safety in handling. The Pierce Fuse can be removed from the circuit, renewed and returned in fifteen seconds. So simple is the operation that a dime or a screw-driver is the only tool required. There are no loose pieces to contend with.

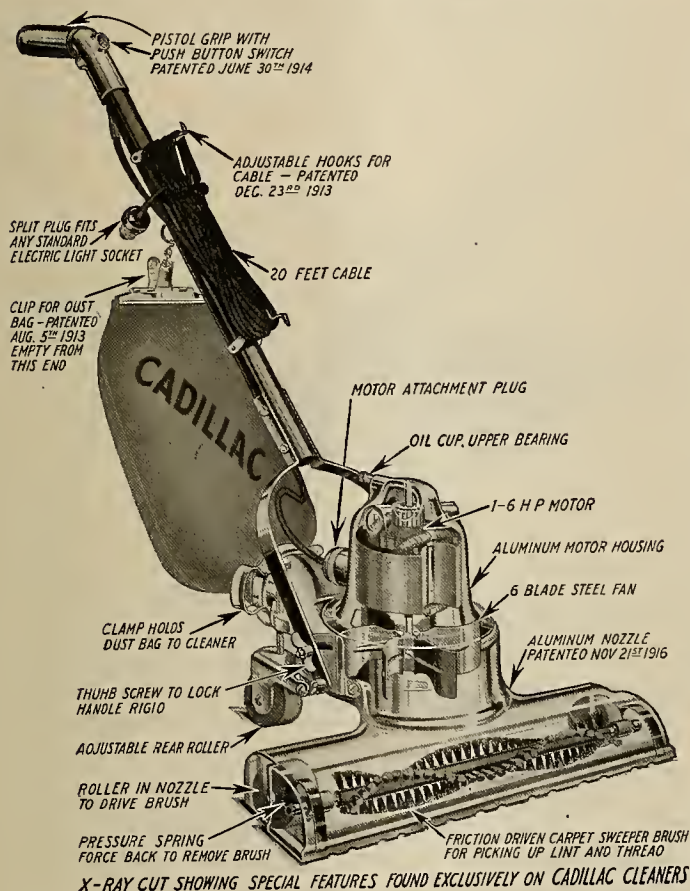
An original and unique venting arrangement is provided to take care of the gases that accumulate when a fuse is blown, thus minimizing the charring of the fiber or the freezing tight of connections on heavy shorts. The knife-blades are always rigid and in perfect alignment, insuring positive contact.

Pierce Fuses are made for 250 and 600 volts, ranging from 3 to 600 ampere capacity.

LOCOMOTIVE TYPE AMPERE HOUR METER

The experience of the past few years in the operation of storage battery trucks, tractors and battery mine locomotives has clearly demonstrated that the chief problem in the operation of these devices is the problem of the storage battery. Accordingly, the ampere hour meter, which is the only device that automatically gives a true indication of the state of charge of the storage battery at all times and automatically terminates the charge at the proper time, is of special importance in this connection. A new Locomotive Type Ampere Hour Meter has just been designed by Sangamo Electric Company of Springfield, Ill., in order to meet the severe requirements as to overload and vibration experienced in this particular service.

The Ampere Hour Meter when installed permanently in the storage battery circuit on the truck, tractor or locomotive, registers every ampere hour which the battery discharges in driving the vehicle, and since the total battery capacity is indicated by the red "Empty" hand on the meter, the black hand indicates the remaining capacity left in the battery. The operator then knows at all times how much farther he can run the truck. When the battery is later put on charge



loose lint, thread and hair. The brush in question is revolved by friction off the front rollers, tension spring holding the brush in contact with the rollers at all times.

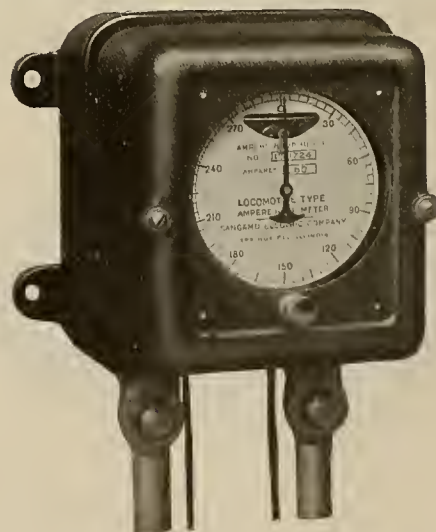
Features of the new model machine are an improvement in the method of raising and lowering the nozzle for use on long or short nap carpets, and a device which enables the handle to be held rigid in any desired position. This latter is a particularly desirable feature in cleaning stairs.

FERRULE AND KNIFE-BLADE FUSES

A renewable fuse, manufactured by the Pierce Fuse Corporation of Buffalo, N. Y., has features which make it especially safe, and greatly facilitate refilling and renewal.

One end of the fuselink is slotted at the end, and the other is slotted at the side, thus making it convenient for inserting in position, it being only necessary to loosen the two screws which, when tightened, hold the fuse in place. To refill the Ferrule type fuse unscrew the cap, pull it apart, loosen the screws, insert the new fuse link, tighten the screws and screw on the cap. To refill the Knife-Blade type, simply pull it open, loosen screws, insert the new fuse link, tighten the screws and close. It will be seen that the fuse cannot be inserted in the clips unless it is fully closed—a fact which

the ampere hour meter registers as the charge proceeds, operating in a direction reverse from that of discharge. When the battery has been fully charged the meter will register zero and make contact within the meter, which trips a circuit breaker in the charging circuit.



No battery is 100% efficient. More charge must be given than was taken out on the previous discharge, so there must be a certain amount of excess charge each time the battery is charged. This feature is automatically provided for in the Locomotive Type Ampere Hour Meter by means of a variable resistor device which causes the meter to run slower by any desired percentage on charge than on discharge for equal current flow. This automatically provides that the battery will be given any desired percentage of overcharge, for by the time the meter indicating hand gets back to the full charge position, all of the previous discharge plus a certain percentage overcharge (depending upon the setting of the variable resistor element) will have been put back into the storage battery. This feature is entirely automatic, and once the resistor has been set at the desired percentage of overcharge, no further attention need be given the device.

This meter, to meet the severe requirements of mine locomotive and industrial truck service, embodies several distinct improvements over previous Sangamo Ampere Hour meters:

It will carry 300% load continuously and 500% load for 3 minute periods without undue heating of any parts, and it is made dust and moisture proof by means of improving binding posts, terminals and soft rubber gasket in case.

Special treatment is given to both the armature disc and armature box interior, which has reduced the formation of mercury dross to about one-fourth of that formerly experienced. This will probably improve the meter operation very greatly and eliminate trouble due to meters being slow on account of dross.

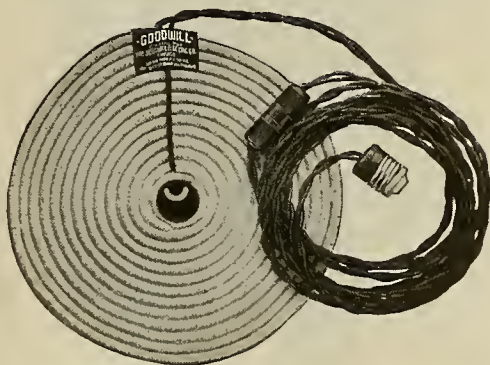
Lock washers throughout and special rugged construction combined with mercury flotation of the rotating element, make the locomotive type meter immune from vibration and loads.

AN ELECTRIC PAD

Some of the objections to the idea of an electric warming pad have been the possibilities of short circuiting in the thermostat, the relation of the temperature of the thermostat to that of the pad, and the question of durability.

An electric pad manufactured by the Goodwill Electric Company of 57 East Van Buran St., Chicago, Ill., has an adjustable thermostat with windings which are a continuation of the same resistance wires that heat the pad, with the result that pad and thermostat run at exactly the same temperature.

In the thermostat box are seventeen fibre washers, insuring perfect insulation. The contact points are of pure platinum, and there is no arc across them. The complete



thermostat is sealed in its metal box, protected from dirt or corrosion, and controlled from without through a semi-circular slot.

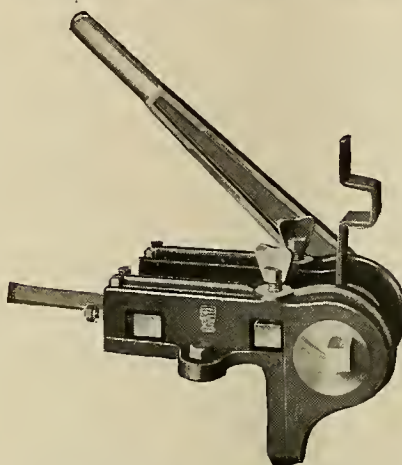
The pad itself is built from a core twenty feet long wound with two lines of insulated resistance wire. These are connected in parallel and are continued over the thermostat arms, the thermostat itself being in the very center of the

pad. Should one line somehow be broken, the pad will operate satisfactorily on the remaining one. The entire core is sewn between two pieces of heavy cotton flannel in the form of a helix. The result is a ten-inch circular pad, pliable and capable of withstanding the roughest treatment. Two covers and twelve feet of special cord, with screw and connection plugs, are supplied with each pad.

The standard Goodwill Pad is 10 in. in diameter and runs on 100 to 125 volts. A smaller type has recently been developed in a crescent shape, 6 in. long and 2½ in. wide. It takes 45 volts and is equipped with a reducer for 110 volt systems.

AN ADJUSTABLE BUS BAR BENDER

A universal bending machine, with a capacity of up to 2 ft. by ¼ in. copper bars, has been developed by the General Devices & Fittings Company of Chicago, Ill. One ad-



This machine can be adjusted to bend bars of various sizes.

justment only is necessary, and that is setting the nose plate to the thickness of bar being used, after which any number of duplicate bends can be made with great speed.

The machine will bend ¾ in. U, or offset without disfiguring the copper in any way. This can be done in place on a long bar, and is a valuable feature in cabinet box work. Spring back adjustment is provided so that true 90° bend is effected.

The machine can be bolted to the work bench or carried around and set up by means of a couple of clamps. It is operated from either side as found desirable, by using the wrench handle on the square boss supplied on both ends of the bending trunnion.

NEW TYPE OF ENGINE

A new type of Uniflow Poppet Valve Engine is announced by the Nordberg Manufacturing Company of Milwaukee. It is built in sizes ranging from 200 to 2000 h.p. for any available steam pressure, any available superheat, any available vacuum and any available back pressure.

Of special interest is the fact that the engine can be changed from condensing to non-condensing operation on the reverse, while running.

FUSE AND CIRCUIT TESTER

The Universal Fuse and Circuit Tester is a device for the testing of all alternating or direct current circuits from 110 to 600 volts. It is used for locating open or short circuits, grounds, blown fuses, or any other trouble occurring in lighting or power lines or apparatus. The complete tester weighs 8 oz. and measures 3 in. long, 2 in. wide and 1 in. deep—a convenient size for inspectors, trouble men, metermen and linemen of light and power companies to carry in the pocket.

It is manufactured by the Electric Tester Company of 1204 E. Taylor street, Portland, Oregon.

Books and Bulletins

Liquid Fuels for Internal Combustion Engines

by Harold Moore, M. So. Tech., F. C. S. Size $5\frac{1}{2}$ by $8\frac{1}{2}$ in., 200 pp.; published by D. Van Nostrand Company, 25 Park Place, New York, and for sale by the Technical Publishing Company, San Francisco. Price \$5.00.

Hitherto most investigations of liquid fuels have been principally concerned with their use for external combustion; engine development during the last few years, however, has made their use for internal combustion the more important. This treatise, which aims to be a practical manual for engineers and chemists, explains concisely the chemical differences existing among liquid fuels, and their applications to various types of engines. The book is in three parts, is illustrated with a number of diagrams, and has an appendix tabulating the calorific properties of various fuels, and a glossary of trade names for petroleum products.

Electromagnetic Theory of the Telephone Receiver

This paper, published as Bulletin No. 17 of the Electrical Engineering Department of the Massachusetts Institute of Technology, Research Division, is the work of A. E. Kenelly and H. Nukiyama, and was presented at a meeting of the American Institute of Electrical Engineers in March of this year.

From the pen of A. Kenelly, who is Professor of Electrical Engineering at Harvard, and Director of Electrical Research at the Massachusetts Institute of Technology, come two other papers of interest—"Transmission-Line Computations" and "A New Geometrical Model for the Orthogonal Projection of the Cosines and Sines of Complex Angles."

Screw Threads

This publication is a complete and useful bibliography of available material on the various forms and systems of screw threads, including reports of professional men relating to their actual experience along these lines. It was prepared at the request of the U. S. Screw Thread Commission by Henry E. Haperkom, Librarian of the Engineer School Library of the U. S. Army, and is arranged in convenient alphabetical form for easy reference. Copies may be obtained free of charge from the Bureau of Standards, Washington, D. C., or from the Engineer School Library, Washington Barracks, D. C.

Fireman's Fund Register

An extremely useful compilation of data pertaining to shipping appears under the title "Fireman's Fund Register," issued annually in San Francisco by the Fireman's Fund Insurance Company. In addition to a complete list of vessels owned on the United States Pacific Coast—with tonnage, dimensions, owner, place of building and so forth—this survey includes a valuable summary of nautical information—towage and portage rates in various Pacific Coast harbors, lists of dry docks and marine railways, storm warnings, rules of the road at sea, distress signals, coast guard stations and a quantity of other useful information.

The "Twenty Year Club"

The Ward Leonard Electric Company of Mt. Vernon, N. Y., has a "20-Year Club" for all who have completed twenty years or more service with the company. A folder containing photographs of the members and the company founders has recently been issued.

Electric Smelting of Iron Ores

"The Commercial Feasibility of the Electric Smelting of Iron Ores in British Columbia," by Alfred Stansfield, is the subject of Bulletin No. 2, 1919, from the B. C. Department of

Mines, Victoria. The conclusions are that ore, power and charcoal are available, but that the present cost of power is more than the industry can bear. A new process, however, is being investigated and is expected to surmount this difficulty. Interesting details are given regarding plants in Sweden, and at Bay Point and Heroult in California. Among the appendices is a report on Electric Pig Iron by Beckman & Linden Engineering Corporation, of San Francisco, who also supplied most of the information that appears in the report.

Bureau of Mines

Technical Paper 214 of the Bureau of Mines is by E. W. Dean, and is entitled "Motor Gasoline Properties, Laboratory Methods of Testing, and Practical Specifications."

The Bureau of Mines also issues, as Bulletin 144, the report of a joint committee appointed from the Bureau of Mines and the United States Geological Survey by the Secretary of the Interior, to study the gold situation.

A complete report of research work on war gases is published by the Bureau of Mines under the title "War Gas Investigations." The report is the work of Van H. Manning.

Bureau of Standards

"Electrical Characteristics and Testing of Dry Cells" is the title of Circular No. 79 issued by the Bureau of Standards.

Technical Literature

A brief catalog is issued of the Franklin and MacNutt and the Franklin and Esty engineering books published by Franklin & Charles of Bethlehem, Pa.

The D. Van Nostrand Company of New York has sent out its March-April record of scientific literature.

The Underwriters Laboratories have printed their April, 1919, lists of Appliances Inspected for Accident Hazard and Inspected Automobile Appliances. These lists are revised semi-annually.

Lighting Fixtures

A singularly artistic and attractive catalog has been sent out by the Wagner-Woodruff Company of Los Angeles, to describe the Briterlite Units. It is printed on heavy cream paper, with illustrations in sepia tone, and has a thick dark brown paper cover with gold lettering.

Elliott-Fisher Magazine, N. E. L. A. Edition

The May, 1919, issue of the Elliott-Fisher Magazine is a special edition for the National Electric Light Association's Atlantic City Convention. Inside an attractive front cover, picturing the beach at Atlantic City, comes a full and interesting account of the billing systems of several electrical companies, with numerous effective illustrations and diagrams.

Miscellaneous

The Sprague Electric Works of the General Electric Company have sent out a well illustrated booklet describing the Sprague Adjustable Loop System.

A folder concerning the Johnson Electric Buffer issued by the U. S. Electrical Manufacturing Company of Los Angeles, California.

From the Pacific Gas & Electric Company, San Francisco, comes an effective illustrated folder on Gas and Its Uses.

The Cutler-Hammer Manufacturing Company of Milwaukee, Wis., has issued a well designed two-color booklet of sixteen pages containing reproductions of helps in merchandising electrical appliances. From the same company comes a small illustrated folder concerning electric soldering irons.

Remco Redwood Pipe is described and prices and details of types available given in a recent well illustrated catalog issued by the Redwood Manufacturers' Company of San Francisco.

NEW ELECTRICAL DEVELOPMENTS

(Hydroelectric developments and important new city structures characterize the activities of the Northwest for the past two weeks. The Pacific Central District records new bond issues and extensive irrigation projects, while from the Southwest and Inter-mountain District comes information on city improvements and important financial transactions.—The Editor.)

THE PACIFIC NORTHWEST

SEATTLE, WASH.—The Everready Electric has been incorporated for \$30,000 by A. H. Campbell and others.

SEATTLE, WASH.—The Angeles Aircraft Corporation has been incorporated for \$200,000 by F. Angeles, Chas. P. Allen and A. E. Lowe.

TACOMA, WASH.—A special election to authorize the purchase of the Lake Cushman power site, and the issuing of \$300,000 in bonds for construction has been announced by the city council.

CASHMERE, WASH.—A resolution has been passed ordering the improvement of streets by building concrete or cement sidewalks, four feet wide, and curbing with concrete or cement, both sides; also building a system of street lighting, both sides.

SEATTLE, WASH.—The Lake Burien cars will run on the elevated railway and on into the city, the council having ordered condemnation proceedings started which will relocate the North terminus of the Lake Burien electric line.

SOUTH BEND, WASH.—The city council has ordered the Willapa Electric Company to start at once on repairs and improvements on that portion of the streets occupied by its car tracks. This calls for a considerable amount of paving.

BEND, ORE.—Work on the long-deferred Suttles Lake irrigation project in Jefferson county is to be started at once, and construction machinery is already on the way to the lake. Fifteen thousand acres of land are included in the project.

PENDLETON, ORE.—In order that there may be no further delay in the initiation of the McKay project in this county, it is probable it will be included in the Senate \$50,000,000 irrigation bill. E. P. Dodd, of Hermiston, has gone to Washington to work to this end.

ROSEBURG, ORE.—William Polman of Baker, Ore., owner of the local light and water plant, was here recently inspecting the property with a view to making improvements. Pumping and power plant on the North Umpqua will be improved and the entire system put in shape.

OROVILLE, WASH.—D. J. Broderick, engineer in charge of the proposed dam construction at the falls of the Similkameen to be constructed for the Okanogan Power Company, is now in camp at the falls, assembling materials and laying out plans to push work as soon as possible.

PROSSER, WASH.—Farmers are arrayed against each other in the litigation now being tried in the courts of Benton county to determine the fate of the \$18,250,000 Horse Heaven project, which has been discussed for fifteen years and now seems nearer a realization than ever before.

SEATTLE, WASH.—Removal of the street railway offices from the building of the Puget Sound Traction, Light & Power Company at Seventh and Olive streets, Seattle, to the county-city building has taken place. The entire west wing of the fifth floor has been fitted up for the purpose.

BELLINGHAM, WASH.—E. F. Williams, engineer of Seattle, will investigate the feasibility of a plan to divert the South Fork of the Nooksack river into the Skagit river with the idea of installing a power plant of about 14,000 kilowatts capacity. He is the owner of the water rights on the South Fork.

KLAMATH FALLS, ORE.—A new pumping irrigation system, by which water will be taken from Lake Ewauna, a short distance south of

this city, and placed on 3200 acres of fertile land belonging to H. H. Van Valkenburg, R. V. Ess, H. A. Talbot, B. E. Kerns, W. C. Ezell and E. H. Hawkins, is now nearly completed.

SEATTLE, WASH.—Supt. J. D. Ross of the lighting department is making preparations to enlarge the Lake Union steam plant of the city lighting department on the theory that the city council will vote \$1,000,000 in utility bonds to finance the purchase and construction of an additional unit of 14,000 kilowatts capacity.

CALDWELL, IDA.—Preliminary steps have been taken toward organization and drainage of that section of the city of Caldwell and a portion of the Pioneer irrigation district which lies between the city limits and a bluff north of the city. J. B. Bond, director of reclamation, was in Caldwell recently going over the ground with local men with a view to immediate organization of a local drainage district to cover that area.

TOLEDO, ORE.—The Fisher-Storey sawmill, destroyed in a recent fire at this place, is to be rebuilt on a much larger scale, according to J. O. Storey of Tacoma. It will be motor-driven, power being supplied by a plant built at the mill. The plant will be largely of concrete construction of sufficient capacity to supply power to Newport, Yaquina, Toledo, and perhaps some smaller mills in the vicinity of Toledo. The cost will be about \$150,000.

PETERSBURG, ALASKA.—Citizens are organizing a company to install a hydroelectric power plant on Five Mile Creek and deliver power to the city. The city council is to constitute the majority of the board of directors, and the company is to issue bonds for \$40,000, the estimated cost of the first unit of the plant, the bonds to be taken up by the city, which will become the owner of the enterprise. Captain H. P. Crowther of Juneau is doing the engineering work.

KLAMATH FALLS, ORE.—News that Klamath County irrigation projects appropriations of \$2,700,000 are included in the Appropriation Bill to complete irrigation projects, as recommended by Secretary Lane and favorably reported by the State Irrigation Committee, has been received here. Reclamation officials indicated that should this amount be secured it might be sufficient to complete the watering of 145,000 acres in the Klamath project, of which 45,000 acres are now under irrigation.

KELSO, WASH.—The North Coast Power Company has contracted with N. A. Strand of this city to build a brick sub-station at the rear of its office building in this city, large enough to house three large 20 kilowatt transformers, which will be moved here from Winlock. The transformers now in use here will be moved to the Kalama River plant. The company is rebuilding the line from Kelso to Kalama to carry a load of 66,000 volts. These improvements involve an expenditure of close to \$40,000.

BEND, ORE.—Preliminary engineering work for the construction of an 1800 horsepower plant on the Tumalo at the Columbia Southern ditch has been started by the Bend Water, Light & Power Company, following the return of Manager T. H. Foley from Salem. The estimated cost is \$125,000. Power development on the Tumalo was made necessary when plans for building a 5000 horsepower plant at Lava Falls were canceled by the tying up of all Deschutes water-rights for irrigation.

YAKIMA, WASH.—The sundry civil appropriation bill recently reported to the house of

representatives carries the following northwest items: Continuing work on the Yakima irrigation project, \$353,000; Okanogan project, \$325,000. Improvement, including roads and trails: Mount Rainier national park, \$325,000. New buildings: McNeil Island penitentiary, \$182,850. Continuing work on Alaska railroads, \$2,038,029. Completing public building, Cordova, \$64,500. Investigating mineral resources of Alaska, \$75,000.

THE PACIFIC CENTRAL DISTRICT

CORCORAN, CAL.—An election will be held in the proposed Corcoran Irrigation District on July 17th for the purpose of determining whether or not the district shall be organized.

PALO ALTO, CAL.—The municipal power plant here will be equipped with a new Diesel engine and a generator within 90 days, as a result of the issue of \$75,000 bonds authorized.

KING CITY, CAL.—A well to irrigate another unit of 600 acres is being sunk by the Salinas Land Company on the table land next to the hills. It is planned to have it in operation for next season's crop.

MODESTO, CAL.—Directors of Waterford irrigation district are advertising for the sale of \$205,000 bonds to be sold July 12th. The canal system will be improved and water rights purchased from the proceeds.

REDDING, CAL.—The Happy Valley irrigation district has sold \$255,000 worth of 6 per cent bonds in San Francisco at 98. The district is bonded for \$615,000, as \$265,000 worth of bonds was sold six months ago.

OROVILLE, CAL.—The power plant that is to be erected by the Great Western Power Company at Caribou near Belden, is to be built by the Stone-Webster Company of Boston, the company which had charge of the construction of the Hog Island shipyards.

MADERA, CAL.—Petitioners for the formation of an irrigation district, to be known as Medano Irrigation District, will present their petition to the Irrigation Board of the State of California, at a meeting of the board to be held in San Francisco on July 17th.

QUINCY, CAL.—The Quincy Water Company and the Quincy Water Commission have agreed upon the construction of an additional reservoir of 250,000 gallons capacity. The reservoir will be built in Goodwin Ravine, immediately south of the present reservoir, and will cost approximately \$2400.

MAYFIELD, CAL.—It was voted unanimously on the second resolution to call an election of the voters for the purpose of bonding the town for the following sums: Electrical distributing system, \$20,000; well, pump and motor for water works, \$5,000; water mains on streets to be paved, \$5,000; total, \$35,000.

REDDING, CAL.—The Northern California Power Company is acquiring land along Pit river just above Henderson in the Big Bend, near the site of its tunnel now being dug in connection with its greatest power development. Agreements filed here show six months' options on several tracts, the purchase price to be \$21,500.

SACRAMENTO, CAL.—W. L. Kann, a Pittsburgh capitalist, is associated with a number of San Joaquin county people in the Farmington Land and Irrigation Company. Articles of incorporation were filed with the Secretary of State. The capital stock is \$500,000. The company has 2000 acres of land, and will provide an irrigation system.

SACRAMENTO, CAL.—A resolution permitting the Pacific Gas & Electric Company to abandon its service on Fifteenth, between K and T streets, was passed by the City Commission. It carries a proviso that the M street cars must be operated, and that the service must be re-established at the demand of the city.

STOCKTON, CAL.—The Oakdale and South San Joaquin Irrigation districts have refused to accept the proposition of the Sierra and San Francisco Power Company to furnish water to the districts without charge, on condition that the districts lend the power company their credit to the extent of \$2,000,000 or \$3,000,000.

NEVADA CITY, CAL.—The Pacific Gas & Electric Company has started a large improvement job on Bear River, just below the Narrow Gauge railroad bridge. Preparations are being made for installing a large concrete settler, 350 by 50 feet in size, at an estimated cost of \$60,000. The settler will be at the intake of the canal that runs through Placer county.

SACRAMENTO, CAL.—The filtration plant bond election for \$1,800,000 won for the bonds by a majority of 273 votes above the necessary two-thirds. Immediately following the counting of the votes it was announced by the management of the Sacramento Savings Bank and the Fort Sutter National Bank that the projected eighteen-story business block would be built immediately.

SAN FRANCISCO, CAL.—In accordance with a resolution adopted by the board of directors of the Pacific Gas & Electric Company, authorizing the issuance by the company of \$3,500,000 first preferred stock, the company has filed with the Railroad Commission an application for an order approving the issue. According to the petition the stock is to be sold at a price that will net the company not less than \$85 a share.

TURLOCK, CAL.—The result of the joint meeting of the Turlock and Modesto irrigation boards, which was in session last week, was the decision of the members of the two boards to go ahead with the preliminary steps toward the beginning of the Don Pedro storage dam project on the Tuolumne river above Le Grange. The engineers of the two districts are to prepare plans and specifications for the work, with estimates of costs, which will be submitted to the state bond commission.

OAKDALE, CAL.—The secretary of interior and forestry service has overruled the protest made by the granting of a storage permit to the Sierra and San Francisco Power Company to take water from the south fork of the Stanislaus river. This applies only to flood water required for storage purposes, and does not affect the water supply of the Oakdale and South San Joaquin irrigation districts. The decision will permit the power company to proceed now with extensive plans for storage in the mountains.

OAKLAND, CAL.—Permission to sell the Oakland, Antioch and Eastern Railway, the Oakland and Antioch Railway and the San Ramon Valley Railroad properties to a corporation to be formed to carry on the business of the three lines was granted by the State Railroad Commission. Authorization is given the new company to issue stocks and bonds necessary to carry out the reorganization plan proposed to the Commission. It is stipulated in the order, however, that there are to be bonds not in excess of \$1,950,000 bearing interest at not more than 6 per cent a year, \$1,330,000 of 6 per cent preferred stock and \$4,000,000 common stock.

NEVADA CITY, CAL.—The Marysville-Nevada Water & Power Company has decided to locate its restraining dam near Colgate, instead of at Bullard's Bar, as originally proposed. The barrier will be used in storage of debris from hydraulic mines at Brandy City, Scales, Depot Hill, Horse Valley and other once famous placer mining camps. It is understood that a merger of some of the larger properties is contemplated, which will facilitate large-scale operations and

economical storage of tailings. The water secured in backing up the river will be used for generation of electric power, and afterwards devoted to irrigation of neighboring agricultural land.

ALAMEDA, CAL.—Sufficient water may be secured from the McCloud river project to supply the needs of the east bay cities for the next 100 years, according to Alameda City Manager Charles E. Hewes, chairman of the east bay water investigating committee, just returned with engineers of the commission from an inspection trip into that region. Due to the constantly melting snows and volcanic formation of the McCloud watershed, springs produce an average supply of 650,000,000 gallons daily, the engineers say. No serious difficulties would confront the engineers in bringing water the 250-mile distance from McCloud to the bay cities, owing to the sloping contour of the valley which permits a concrete ditch the entire way. Power for pumping the supply across San Pablo bay could be generated as part of the project by using mountain streams for hydroelectric energy.

THE PACIFIC SOUTHWEST

GLENDALE, CAL.—Bonds have been voted for the improvement of the city's water system, and for the purchase of electrical equipment.

LOS ANGELES, CAL.—The Pacific Electric Railway will erect a \$50,000 station at San Pedro, which will be a combined freight and passenger station.

PHOENIX, ARIZ.—The Phoenix Street Railway will pave tracks on all paved streets—make repairs on South First avenue and place tracks on the Grand avenue line in condition for operation, etc.

LOS ANGELES, CAL.—A permit for the construction of a new power house for the Pacific Electric Railway at Los Angeles harbor has been granted, and work is to commence at once. The cost will be \$12,000.

SANTA ANA, CAL.—Abandonment of tracks on Main and Maple is under consideration by the Pacific Electric Railway, which contemplates operating a line to Orange by way of a private right-of-way in the east part of town.

LOS ANGELES, CAL.—Application has been filed with the State Water Commission by James A. Paschall for appropriation of waters from an unnamed stream in Tulare county. The diversion works consist of a concrete and rock dam, and a half-mile pipe line.

LOS ANGELES, CAL.—The Southern California Edison Company has filed a petition with the Railroad Commission asking authority to guarantee \$1,150,000 of bonds of the Shaver Lake Lumber Company, a corporation formed to take over the control of the Fresno Flume and Lumber Company and to carry out the terms of a contract by which the Edison Company is to acquire the properties of the Fresno company located in Fresno county and required by the utility to carry out its plans for power development.

THE INTER-MOUNTAIN DISTRICT

MANTI, UTAH.—Citizens of Manti voted July first on a \$20,000 bond issue for a new electric light and power plant.

LUSK, WYO.—The installation in a new electric lighting plant contracted for this city will consist of two 400 kw. G-E generators.

ROOSEVELT, UTAH.—Half a dozen cities and towns in this vicinity will be supplied with electric light and power from a plant being put in by the Uintah Power & Light Company, which company has engineers at work locating the site.

DUBOIS, IDA.—The town of Dubois has closed a contract with the Ashton-St. Anthony Power Company whereby electric service is to be delivered to the town limits and the town is to take it from that point for distribution to users. A

line from Hemer to Dubois is now being constructed.

SALT LAKE CITY, UTAH.—Judge Joshua Greenwood, of the Public Utilities Commission, recently visited Beaver City, to hear a report of citizens on service furnished by the municipal plant in that city. The citizens are asking for better service.

SEDGWICK, COLO.—Distribution lines and a fifteen-mile transmission line from the outskirts of Julesburg, Colo., will be constructed here, to carry power from the municipal electric plant at Julesburg. The Hennington Engineering Company of Omaha, Nebraska, is in charge of the construction work.

HEBER CITY, UTAH.—City officials may find it necessary to close down the present municipal plant and arrange to purchase current from the Utah Power & Light Company. The present plant is in poor condition and considerable rebuilding will have to be done if it is again put in first class condition.

SALT LAKE CITY, UTAH.—Lafayette Hanchett, representing the Dixie Power Company, and Manager Woodhouse of the same company, are conferring with the Utah State Road Engineers in an effort to work out plans for joint construction of a power line and roadway between St. George and Cedar City.

SALT LAKE CITY, UTAH.—The Utah Light & Traction Company has filed its brief of 125 printed pages with the Public Utilities Commission, regarding the physical valuation of the company's property, hearing on which was had a few weeks ago. The brief was prepared by John F. MacLane, the company's counsel.

TWIN FALLS, IDA.—The Farmers' Mutual Light & Power Company has now been organized in this city with the election of temporary officers, who will proceed to effect a permanent organization at once. Headquarters of the new company will undoubtedly be at Buhl, as most of the capital is represented in that city.

DENVER, COLO.—The Denver Tramway Company, in protesting against the restoration of the five-cent fare, made a statement that this reduction in their income would necessitate a curtailment of their service on several lines, dismissal of 250 employees, reduction in the scale of wages and a number of other cuts in service.

BRIGHAM CITY, UTAH.—The State Public Utilities Commission has just granted to the Brigham City municipal electric light and power company permission to increase its rates six-tenths of one cent per kilowatt hour for the first 100 hours use per month and five-tenths of one cent per kilowatt hour for all in excess of 100 hours use per month.

OGDEN, UTAH.—Approval of the Secretary of Agriculture of the United States, for the erection of a large power plant on the Duchesne river in Utah by the Great Basin Power Company was received by the District Forest Engineer June 7th. Construction work on the plant, which will provide 8000 to 10,000 horsepower, will be started immediately. The plant when completed will supply power to the Duchesne valley and part of Salt Lake valley.

BOISE, IDA.—Permission has been given to the Mackay Light & Power Company to extend its transmission line to Arco, through Lost Valley, by the Public Utilities Commission. With a certificate of convenience and necessity in its possession the Mackay company will be able to serve an additional large territory. The Ashton-St. Anthony Power Company has been seeking permission to enter the Lost Valley territory with its lines and the town of Arco has considered voting \$60,000 in bonds for a municipal power plant to furnish power and light to Mud Lake. However, it was cited by the Utilities Commission that it would be impossible for the plant to deliver a return on the investment for Arco people, while on the other hand the privately owned company, with the large territory at its disposal, can operate in this district at a profit.

THE VACUUM CLEANER — THE VACUUM CLEANER

CONES DISCOVERED UNDER ONE'S SLEEPING BAG at 1 a.m. may be small things in themselves, but they are far from unimportant in the scheme of the universe. With a more pleasant significance it may be said that the items here presented, though not lengthy, nor in most cases weighty, are nevertheless to be numbered among the things of life worth noting. With that thought in mind they have been rescued from the Editor's files by the office vacuum cleaner, and are here presented for your interest and edification.—The Editor.



If electric light bills were itemized, suggests Chas. E. Thompson of the Toledo Railways and Light Company, this is what the family might receive:

Total light bill for your home a month.....	\$5.67
Itemized Statement	
Light consumed in hunting for the dime that your son lost \$.34	
Light consumed in the parlor on the ten evenings that Jim Perkins called on your daughter, Mary (Mary dislikes Jim)	2.25
Light consumed in the parlor on the fifteen evenings that John Moore called on your daughter, Mary (Mary likes John) .....	.05
Light consumed while you tried to figure out an over-charge of fifteen cents on last month's light bill.....	.18
Light consumed when you forgot to turn-off the light in the cellar .....	.50
Light consumed while you tried to repair leak in water pipes .....	.60
Light consumed while plumber (whom you were finally forced to call in) told about his war experiences and explained how he would repair leak.....	1.20
Light consumed during actual work of repairing leak.....	.10
Light consumed while eating, bathing, shaving, house cleaning, figuring up household bills and accounts.....	.40
Light consumed while spending a quiet evening at home with your family .....	.05

Increased car fares have been cleared of the charge of burdening the working man, and the electric railway companies are now acclaimed as benefactors of the human race in general and of the thrifty workman in particular—thus: If you have been walking to work to save ten cents a day you can now save twelve cents. This brilliant discovery is attributed, naturally, to an Irishman.

He Found Out, as may be judged from the pictures below, which are contributed by Emerson Easterling of Ashland, Oregon, from the fullness of his experience. The ultimate fate of experimenters of the type of intelligence written upon the features of the victim of these adventures may be in some measure forestalled by an adequate education of the public in

matters electrical by means of such courses as that on Practical Electricity now running through the columns of the Journal of Electricity.

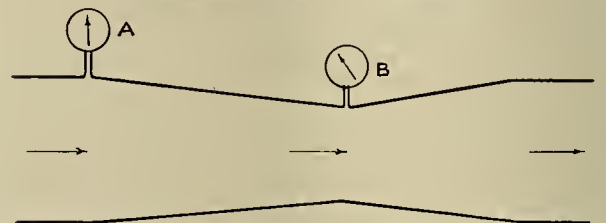
Running the universe is a power man's job, in the opinion of little five-year-old Arthur Rankin, who lives at Lahontan, Nevada. His uncle, E. E. Hornberger, is a power station operator employed by the Nevada Valleys Power Company at that place. Arthur occasionally visits his uncle while he is on duty at the power station. His uncle has explained and shown him the turbines, governors and switchboard. A few days after one of these visits the little chap was asking his mother a series of questions. "Mother, what makes the wind blow? What makes it snow? What makes it rain?", etc. To all of these questions his mother replied that God did. The boy thought this over for a moment and then looked up at her, saying, "Mother, God must have an awfully big switchboard."

Speaking of Typographical Errors, the following information was noted and clipped from a recent number of Commerce Reports:

From 100,000 to 400,000 pounds of pig iron intestines are exported from China annually, for use as sausage casings.

Later this item appeared in a Pacific Coast magazine under the title "What Breed of Pigs?", but it read quite smoothly with the "iron" omitted. The proof reader had evidently seen the error and not the joke.

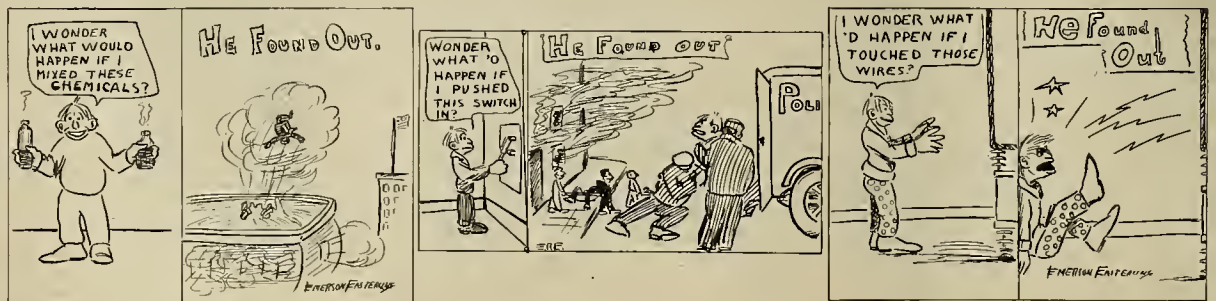
ENGINEERS OF YESTERDAY—13. BERNOULLI
(Series compiled by A. L. Jordan)



If a water main has a flow of current as shown, will the gauge at the constricted portion B read more or less than the one at A?

Daniel Bernoulli, an Italian-Swiss, published in 1738 a famous work on hydrodynamics in which he stated that pressure decreases as velocity increases. The answer is then that B reads less than A. Experiment shows this to be true and the principle is the basis of the Venturi meter invented by Clemens Herschel in 1888. The water supply of San Francisco is measured by this kind of meter. The principle also explains the curves of a baseball thrown by a skillful pitcher.

Bernoulli was appointed professor of mathematics at Petrograd when he was only twenty-five, studied the inclination of the planetary orbits, a method of measuring time at sea, and proposed the propulsion of ships by water ejected from the stern.



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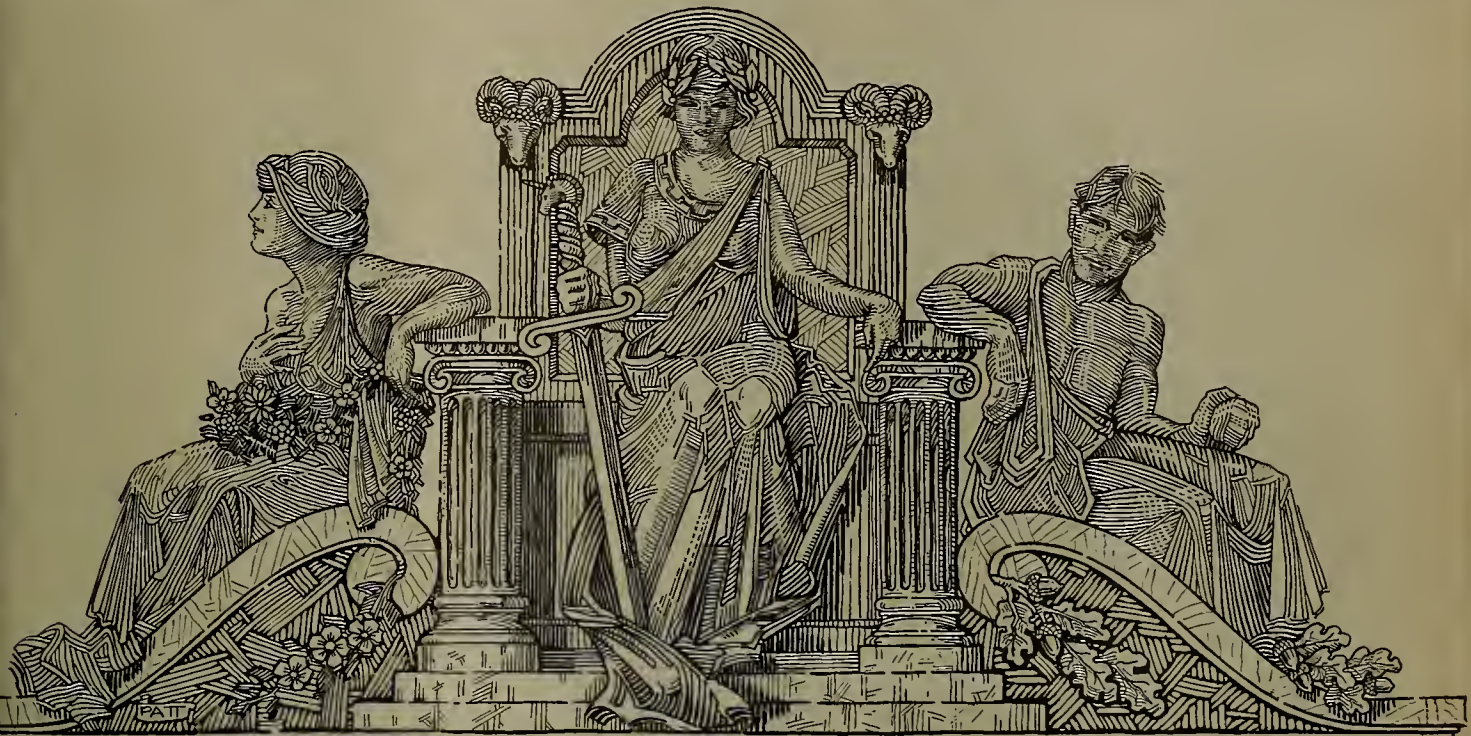
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JOURNAL OF ELECTRICITY

VOL. 43 NO. 3

SAN FRANCISCO, AUGUST 1, 1919

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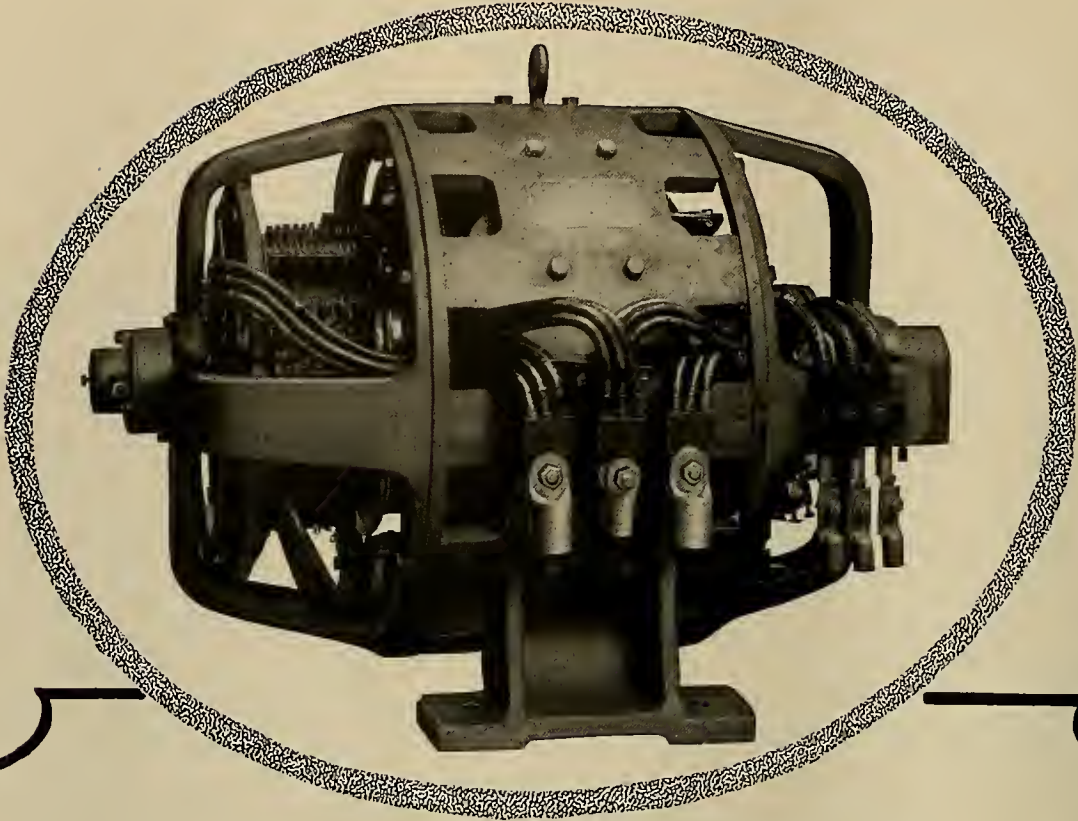
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Commutating poles insure sparkless operation, while an auxiliary squirrel cage winding gives increased starting torque and serves to prevent oscillation or "hunting."

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JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

CLOTILDE GRUNSKY, Associate

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A NEW RECORD IN QUICK CONSTRUCTION

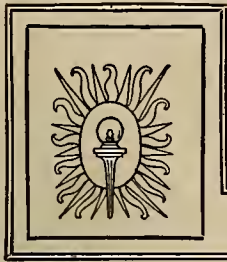
A truly remarkable photograph of perhaps the first tangible evidence of hydroelectric after-the-war construction work now in progress in the state of California—scene in the development of the San Joaquin Light & Power Corporation's new Kerckhoff Power House on the San Joaquin River in Fresno County.

This power house will have an output of 45,000 h.p. and work is now being rushed at fever heat to complete it as early as possible during the spring of 1920 in order to relieve the existing power shortage in the San Joaquin Valley.

The photograph shows the incline railroad leading from the top of the mountains to above the dam-site at the North Portal of the principal 8400 foot tunnel unit. This incline is 3000 feet in length and ascends a vertical distance of 1000 feet. At its deepest pitch, it records a grade of 85° and it is necessary to securely tie on materials on the railway cars. The track is standard gauge and the cars are operated by an electric hoist, propelled by 100 h.p. motor with a $\frac{7}{8}$ in. special plow steel cable.

In the foreground is the river and the dam-site. The suspension bridge shows a diamond drill at work making borings of the bed-rock on the bottom. Immediately above the suspension bridge may be seen the North entrance of the 8400 foot tunnel. A huge concrete mixer will be installed at the mouth of the tunnel to handle the crushed rock in the mixture for the dam. The dam will be 400 feet at the top, 100 feet in height, and 50 feet at the bottom. It will contain approximately 30,000 cubic yards of concrete. It will back the water up a distance of two miles to the tail-race of the No. 1 Power House of the San Joaquin Light & Power Corporation, thus creating an artificial lake more than 2 miles in length and 100 feet deep. The lake will be called Kerckhoff Lake.

The picture shows the picturesque location of the camp on the hill side. The camp is declared by the California Commission of Housing and Immigration, to be the best in the State. The work, when completed, will cost \$3,651,000 and the transmission line will cost an additional \$1,000,000. R. C. Starr is the constructing engineer in charge of the work.



JOURNAL OF ELECTRICITY



DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43

SAN FRANCISCO, AUGUST 1, 1919

Number 3

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CONTACT—The One Great Avenue for Results

The splendid achievements of the Pacific Coast Section N. E. L. A., the California Electrical Co-operative Campaign and other movements in the West that are attracting such nation wide attention at present are in large measure due to the fact that perplexing problems of the day are handled in this section of the country in such a way that all branches of the electrical industry are conversant with the points at issue and organization is effected so that contact also is maintained with the public at large.

The big problems before our industry today are largely matters of the economic use of the resources of our nation, the electrification of steam railways, the utilization of our water power and fuel resources, and the bringing about of a close cooperation and understanding between those attempting to solve the problems and the public served.

In forwarding this mutual understanding and close contact with the public, the geographic idea in its working on the Pacific Coast has had a most decidedly helpful influence. A. E. Wishon, president of the Pacific Coast Section N. E. L. A., elsewhere in this issue forcefully recounts the distinct achievements that have thus been accomplished in the West during the past two and one-half years. R. H. Ballard, president of the National Electric Light Association, is now endeavoring to nationalize the entire scheme of association activity agreeable to these triumphs that have been attained in the geographic section idea in the West, and it is believed that such policy as this is far-sighted and truly to be commended.

Member Companies the country over will do well to study into the method of contact that is thus employed in the West, for when this is done, it is believed President Ballard's plan of a nationalized geographic section ideal will receive unanimous endorsement everywhere.

A plea for increased dues which comes from the Engineers' Club of San Francisco, calls attention to the excellent service which clubs of this nature on the Pacific Coast have rendered.

The Desirability of Engineer Clubs

An efficient engineers' club readily becomes the center and home of engineering activities in whatever community it serves. Not only does it provide a central meeting place for engineering organizations and make possible such friendly additions to a society's program as a luncheon round table, but it brings the unattached engineers into the group. It makes for better feeling within the profession and through the opportunity for general discussion of current problems, for the greater unanimity of thought and action of the engineers as a group. The engineer who is at home has an attractive and appropriate place in which to entertain an engineering visitor and the visitor finds among the daily gathering just the men he wishes to meet. So important and useful is this institution that the standing of a community in the engineering

field is very apt to be judged by a stranger on the basis of the Engineers' Club it supports.

Not only is this true when judged from without, but the position of the engineer within his own commonwealth is greatly helped by the strength of the group with which he is associated.

As pointed out by the finance committee of the San Francisco club, engineers have learned from their laboring friends that in organization there is strength and will not be slow to maintain a medium which means so much to them in keeping abreast of the growing opportunities of their profession.

Since 1912 the rice growing industry of California has developed from nothing to a probable crop for 1919 of nearly ten million bushels. To those familiar with the low lying semi-flooded areas on which rice is grown in Japan and China, the fact that this crop is raised on some 150,000 acres of almost arid lands in the interior valleys of California seems incredible.

Electricity Makes Possible New Industry

The answer to this, as to so many other of our modern miracles, is in large measure—electricity. There are some few localities where a convenient stream brings water direct to the land under gravity, but the greater extent of the lands in use are such that water must be pumped from wells or direct from the river or canal. Large electric pumping installations are the result, on a scale which marks a new era in individual farming operations.

An interesting feature in the growing of rice is that by preference it is grown on heavy alkali-type soil which is not suitable for any other purpose and for long was thought entirely arid. The astonishing growth of this industry has brought a new element into California agriculture—one for which electricity is largely responsible and which opens up a new field for electrical operation. The conditions of rice growing and the uses to which electricity is put in some of the larger installations are interestingly presented by W. E. Camp on page 102 of this issue.

For many months past engineers the country over have been watching with unusual interest the very excellent economy in fuel

New Records in Fuel Economy

oil generation of steam power in Arizona. The three power plants in particular are those of the Inspiration Consolidated Copper Company at Inspiration, the New Cornelia Copper Company at Ajo, and the Arizona Copper Company at Clarkdale. In the first of these three steam power plants, all three of which are oil fired, the economy of the turbine plant is limited by the common steam pressure of from 175 to 185 lb., while the two latter plants are designed for 250 lb. pressure. The Inspiration plant is 25-cycle, 3-phase, 6500 volts, and on the other hand the New Cornelia plant and the Arizona Power Company's plant are both 60-cycle, 3-phase, 2300 volts, with estimated maximum loads of 12000 kw., 7500 kw. and 5000 kw. respectively.

An average economy was obtained for the month of September, 1915 at the Inspiration plant, while the plant was still under control of the engineers, of 289 kw-hr. per bbl. of oil as fired. At the new Cornelia plant the monthly report for December, 1918 shows 312 kw-hr. per bbl. of oil and in January, 1919 the average economy rose to 317.9 kw-hr. per bbl. of oil. At the plant of the Arizona Power Company during September, 1917 the final test covering 48 hours' operation in regular commercial service, under variable load due to the regulation of the hydroelectric system, a remarkable record of 333.3 kw-hr. per bbl. of oil was registered.

The account of these three record tests is given in full on other pages of this issue and once again engineers of the West may take pride in the fact that one of their number has established helpful records that add prestige to engineering attainment and at the same time a certain economic factor in power generation that is extremely timely and desirable.

A telephone strike is a public inconvenience. A strike of the employes of a city water company, or, under easily imagined circumstances, of a central station, would be a public calamity. Such instances as the loss of telephone service of recent days, of the electrical workers' strike which tied up Vancouver, B. C. a few months past, as well as the more distant disturbances of Winnipeg, serve as a warning that such possibilities exist.

There are certain public industries in which a strike would be disastrous and as inimical to public welfare as a wholesale desertion in the army. The cutting off of the water supply of a large city, for instance, should not lie within the power of any group of organized employes nor within the danger of a real injustice at the hands of the employer which the employe takes his only means to rectify. It is obvious that when any body, whether it represent labor or capital, is placed in a position where it can dictate terms to the public, it should be regulated.

A recognition of the right of this principle is what led to our present public utility commissions and other rate fixing bodies. The principle should be extended to wages and to labor conditions as well.

This does not mean that the employe should not at all times have some redress. But the solution seems to be in the establishment of some court or body analogous to our Railroad Commissions, before which grievances of public utility employes might be brought, whose judgments should be final and whose decisions should be enforced.

It is an anomalous situation when the public can determine that a street railway company may not charge a six cent fare, as they have in Denver—and when at the same time, the employes of that railway company strike for the higher wages which the company cannot afford to give without a greater income.

It is time that the question be given consideration. We do not need to wait for an actual strike of water company or electrical employes to realize that such a condition would be intolerable and should be forestalled by making other provision for the settling of disputes.

In the July 15th issue of the Journal of Electricity, an article by Robert Falconer pointed out the disadvantages of mentioning price too early in the selling argument.

A Woman's Angle on Mentioning Prices

The question is one which has been much discussed in merchandising circles and on which practice varies. The consensus of opinion of writers on the subject seems to be against the display of prices in window displays or, except incidentally, in advertising, but the retail trade itself maintains no such uniformity of practice.

A recent communication received by the Journal of Electricity from a woman purchaser of electrical goods who had read Mr. Falconer's article, presents a new angle of the argument and one of

particular interest—for, after all, it is the opinion of the customer which counts.

The customer in question agrees with Mr. Falconer in part. She recognizes, of course, that the only reason she is interested in electrical ware is because she has been educated to some extent through advertisements, in the convenience of electricity in the household. But she believes she is already educated:

"Personally I like to see prices in the window, and I believe it is true of most women. Of course, if I were shopping for a collar or a silk sweater I should go into the store just to look at their stock, but I seldom am attracted by an unlabeled exhibit. Prices are too high these days and I suspect the article is more than I can afford. On the other hand an object which appeals to me and is marked at a reasonable figure will often draw me into a store to buy something which had not been in my mind at all.

"I believe this is true of electrical goods as well. I think electrical conveniences are desired by every woman. There isn't a housekeeper who would not like to have her home completely outfitted with electricity—if it were not for the expense. I think it is true that electrical ware is usually less expensive than the public pictures it. A woman will struggle along with a laundress and a wash boiler in spite of any number of electric washing machine demonstrations in the window, convinced that such luxuries are too expensive for her purse. But let her learn that the machine costs only \$125, particularly if it is pointed out to her that this can be paid in monthly installments not much greater than her present cost of laundry—and you will soon find her asking for a personal demonstration in her home.

"The mention of money may not sound well, but it is what is in all our minds and there are few women who begin to think seriously of any article until they know it is within their means. And those few would hardly be customers for electrical household helps."

A frank statement and one which deserves the careful thought of every retail dealer.

The farm bureau is an organization of farmers and ranchers who combine to promote agriculture and to better conditions of farming through cooperative study. This type of organization has been known in various forms and sometimes under other names, throughout a wide extent of the country, but in the West it has come to be so well organized and so universal that it plays a most important part in all movements for bettering farm conditions, among which, of course, the use of electricity is to be numbered.

In California alone there are 429 such community centers at which monthly gatherings are held with an average attendance of forty-one persons. These bureaus work definitely in cooperation with the farm advisors and provide the avenue by which results are passed on from the State University and State experimental farms to the farmers themselves. How much these state agencies have already done in spreading the gospel of a wider use

of electricity on the farm is well recognized. The outline of a correspondence course in electricity for farmers which is briefed elsewhere in this issue is merely typical of such work.

At the present time nine counties are testing out "Farm Home Departments" in connection with the farm bureau, for the bettering of home conditions. Manufacturers of washing machines, electric ranges, vacuum cleaners, indeed of all household conveniences will not fail to see the value of such an organization for demonstrations and educational work. Already the farm bureau has become a focal point for progressive ideas and a public forum before which all persons may present their cases to the rural people. The case of electricity needs only to be openly presented to be won.

The new Webster's Collegiate Dictionary and Webster's New International Dictionary fail to give

any shade of difference in meaning between the use of the words "electrical" and "electric" and yet those of us who constantly mingle with men of the electrical engineering profession know there is a decided difference in usage.

For instance we hear constantly of an "electrical" engineer, never an "electric" engineer, and almost universally we hear of "electric" toasters and quite infrequently do we hear of "electrical" toasters. By study of such instances as these we are able to formulate a rule that will guide us in the most elegant or choice use of these words.

It would seem that the use of the word "electric" is preferred where a piece of machinery or apparatus is involved that is worked or operated by electricity and in almost all cases where inanimate things are to be modified. Thus we have "electric" current, "electric" baker (meaning a stove operated by electricity), "electric" trolley, "electric" supply company (a store that deals in "electric" supplies).

On the other hand, when matters pertaining to things or people connected with "electrical" affairs but not necessarily involving the direct use of electricity are considered, especially where people and organizations are described, the word "electrical" is preferred in its use. Thus we have "electrical" baker (one who operates an "electric" baking apparatus), "electrical" engineer, "electrical" supply jobbers' association, "electrical" contractors and dealers' association, "electrical" engineering profession, and among inanimate uses, "electrical" science, "electrical" affairs and such other instances as may be cited where electricity is not directly employed but which pertain merely to matters "electrical."

NEW JOURNAL SERVICE:—It is with particular pleasure that the Journal of Electricity announces a series of articles on public utility relationships by S. M. Kennedy, general agent for the Southern California Edison Company, to begin in an early issue. Mr. Kennedy is perhaps better known than any other man in the industry for his constructive stand on central station problems of personal adjustment, both within the organization and between the utility and the public.

The series of articles on the Business Library by Miss Louise B. Krause, which has aroused such wide spread interest will continue through September, when it will be followed by a number of articles on the wider service of the Public Library to the business man. A comprehensive analysis of the principles of indexing and filing, of special interest to the library and the large business office will then be presented.

Detailed plans of vital importance to the power man and to the merchandising expert are also under way, of which announcement will be made later.

Electricity Makes Rice Industry Possible

BY W. E. CAMP

(A new industry dependent on electricity has been developed in the West—and with it a new load of no mean proportions for the central station. The way in which the electric pump has transformed arid land into rice fields, partially flooded most of the year, rivals the proverbial blossoming of the rose. The author is intimately familiar with the conditions of the installations in connection with this new work.—The Editor)

Twelve million bushels of rice were raised in California in 1918,—largely on land which is irrigated by water pumped electrically. The industry virtually began in 1912, when it was found that it was not necessary to grow rice on swamp lands, but that the crop could be cultivated in the central valleys of California, with the help of irrigation in sufficient quantity.

At the present time rice is grown principally in the following counties of the Sacramento Valley: Colusa, Glenn, Sutter, Butte and Yolo. Rice is now being grown successfully in other parts of California but the greater acreage is in the counties named.

Requirements of Crop

Irrigation is an important factor in rice culture. After the rice is up water must be applied continuously throughout the season, which means that a uniform depth must be maintained on the land from about May 1st to September 1st and sometimes later.

Soil

Most of the California rice is raised in black adobe soil, containing about 50% clay. The subsoil, usually at a depth of 3 or 4 feet is of tight, close formation, and more or less impervious to water. This has the advantage of providing storage and decreasing the seasonal amount of water required,—a vital factor when practically all of that water must be pumped.

Previous to planting, the land is arranged in contour checks, which are lightly flooded after the rice seed is drilled in. The water is drained after this to allow germination of seed. When the rice shoots have attained a certain stage, varying amounts of water are turned on the land which is then kept in a flooded state until the grain reaches maturity.

Irrigation

Probably most important of all considerations in growing rice is water. Rice requires plenty of water throughout the summer, the total requirements being very heavy.

From 4 acre feet to 6½ acre feet per season

are required, depending on the location and nature of soil. For this reason wells cannot provide enough water for very large acreage. Many small tracts are successfully irrigated from wells, but the larger projects are dependent on river supply.

It is also a question as to whether cold well water might not be injurious to rice unless the water be pre-warmed by open air reservoirs.

Electric Pumps Used

All of the large rice projects along the Sacramento Valley secure their irrigation water from the Sacramento River. Large electric motor operated pumping stations on the river force the water out through the canals, in some cases a distance of 15 or 20 miles. In such cases it is necessary at various points to put in booster pumping stations to change the elevation of the water.

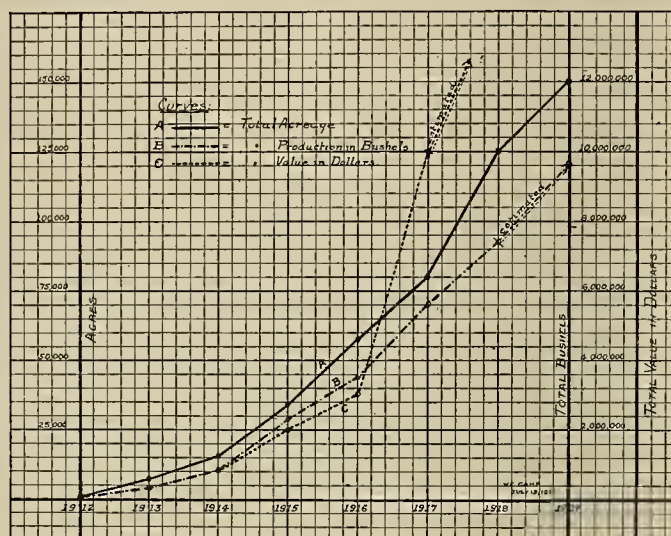
As water is the all important commodity in rice culture, much thought and engineering ingenuity have gone into these large irrigation works. Plants are laid out and constructed for reliability, permanency and efficiency. So important is continuity of operation that spare equipment is often held as insurance.

Sacramento River Plants

There are several plants along the Sacramento River that divert as high as 300 to 350 second feet of water each for a single project. Between Tehama and Knights Landing on the Sacramento River there are about 80 pumping plants with a combined total capacity of about 3300 second feet and requiring about 10,000 hp. of electric motors. This does not include booster plants in canals or projects deriving water from any source other than the Sacramento River.

Design and Equipment

Most of the large pumping stations of later design consist of concrete pits, concrete buildings, galleries for mounting all electrical starting and switch-board equipment, overhead cranes, electric motor driven priming pumps, electrically operated valves, etc. Most of the large pumps are direct connected to standard induction motors through flexible coup-



RICE ACREAGE, PRODUCTION AND VALUE IN CALIFORNIA

The rice industry did not begin in the state until 1912 but has increased within seven years to an acreage of 1,200,000. The curves are based on figures from the U. S. Department of Agriculture reports.

lings. The large motor equipment usually operates at 2200 volts and a station attendant is always in attendance to look after the various plant variables.

Pumps are usually of the horizontal centrifugal type, although vertical equipment can also be used.

Low Heads

Practically all river pumping is moderately low-head duty, from 16 ft. to 23 ft. and the booster plants often operate against static heads as low as

6 feet. The screw type of pump has recently received favorable consideration for this booster duty.

A Growing Field

The rice industry in California is assuming large proportions, and the allied engineering problems in connections therewith—civil, mechanical and electrical—are worthy of the best talent.



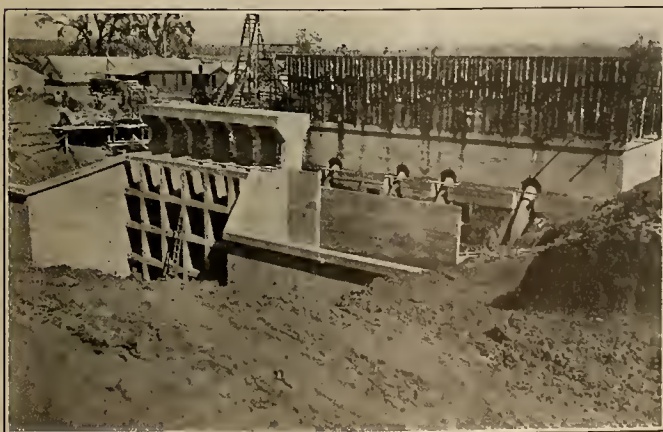
SUTTER BASIN IRRIGATION PUMPING PLANT AT TISDALE WEIR
This plant has just been completed by Leonard F. Yandall, contracting engineer, Stockton, Cal., for this season's operation



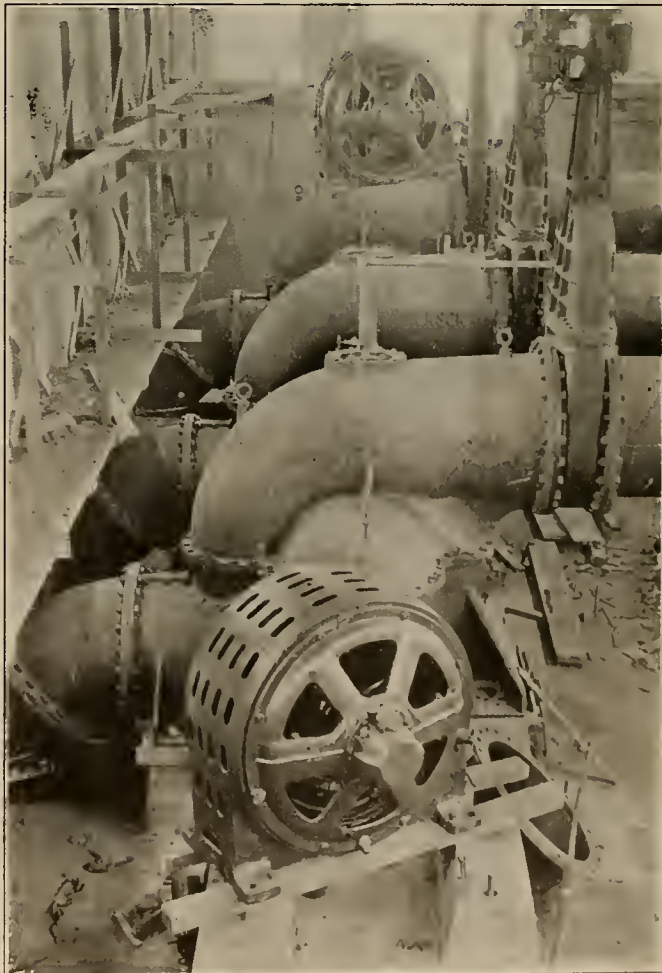
SKIDDING MOTORS INTO THE SUTTER BASIN PLANT
The installation consists of 3-250 h.p., 277 r.p.m., 2200-volt, 3-phase G. E. motors. The ultimate capacity of the plant is 6 units.



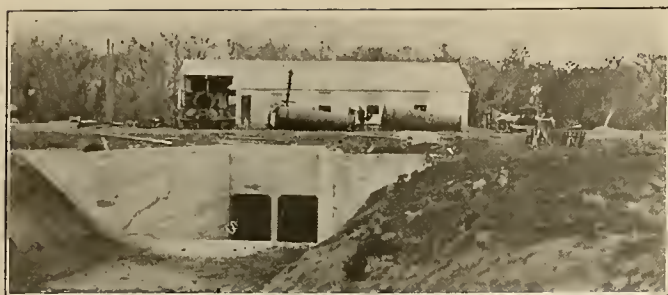
MAIN CANAL AND GATES—SUTTER BASIN
The water is taken from the Sacramento river and is lifted by electric pumps to the level of the rice fields



INTAKE GATES AND PUMPING PLANT DURING CONSTRUCTION
The magnitude of this installation at Tisdale Weir, under the Sutter Basin Co., is shown by this progress picture of the intake structure

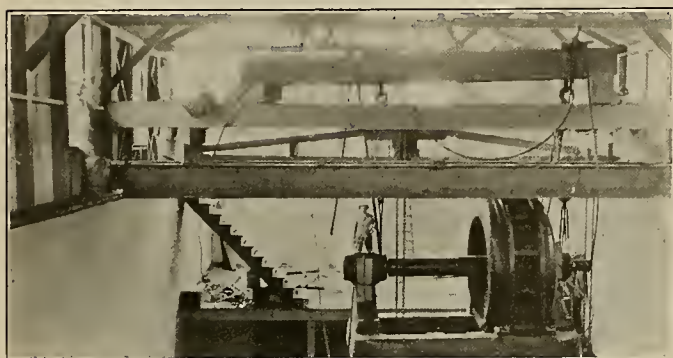


PUMPS AND MOTORS BEING INSTALLED—SUTTER BASIN
The three 42 in. Jackson pumps are in place and the motors just being installed. The normal head is 15 ft., the normal capacity of each pump 50,000 gal. per min.



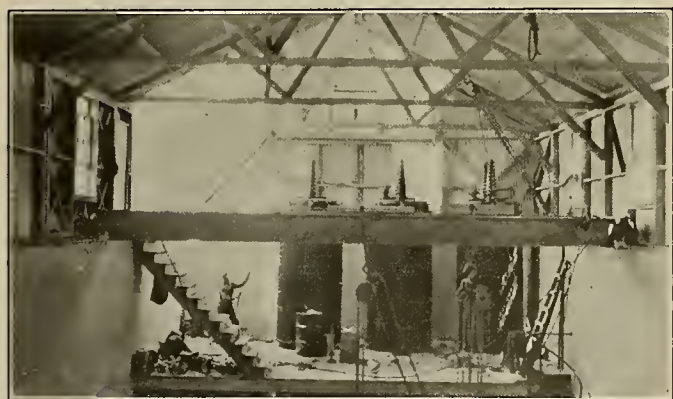
THE PROVIDENT IRRIGATION DISTRICT PUMPING PLANT

This is another of the Sacramento river rice projects located at Sidds Landing. The discharge conduit is shown in the foreground.



INSTALLING THE MOTOR—PROVIDENT PLANT

Sixteen tons of motor is moving in ready for operating the 4—42 in. Jackson pumps. There are 4—500 h.p., 360 r.p.m., 2200-volt, 3-phase G. E. motors in this plant. The pumping head is about 17 ft.



TRANSFORMERS IN PLACE

Three 667 kva. 60,000 to 2200-volt G. E. transformers form part of the equipment. The total capacity of the plant when complete is about 500 second feet.

EMPLOYING AN ELECTRICAL FARM HAND

(A most complete electrical installation on a progressive farm which makes it possible for a farmer to do a much larger proportion of his work without assistance. An example of the advantages of electricity on the practical farm.—The Editor)

Farmers in Blackhawk County, Iowa, demonstrate emphatically that the use of electricity is just as much a matter of economy and convenience to them as it is to the millionaire in his "model farm." Farmers in this neighborhood on farms of all sizes have electricity lighting their house and buildings, pumping water, grinding feed, and running the dairy machinery. One of the most complete installations is that of J. W. Oltrogge, who lives near Readlyn.

The buildings are all of first-class construction, and are electrically lighted throughout. Over the door of the garage is a lamp which lights the walk

from house to barn, and is controlled from four points. Thus there is no need of a lantern, as the light can be turned on at the house, and extinguished on reaching the barn. In the barn is a 7½ horsepower Westinghouse motor driving a Bowser feed mill. Experience has shown just where to set the slide gate in the feed-chute so that the mill gets just enough unground oats and corn, and so it runs without attention. Nearby is a 1 h.p. motor belted to a shaft formerly driven by a windmill. This shaft runs outdoors to a pump which delivers to a concrete tank from which pipes run to various watering troughs. One of these troughs which serves the beef animals, is placed in the wall of a shed so that it can be reached from without or within. Formerly there was trouble with this freezing, but a little immersion heater, taking 500 watts, effectively keeps the water ready to drink. Since there are about 150 head of cattle, the saving of this device is obvious. The motor-driven feed cutter, too, means no hauling of feed over heavy roads, and no shortage of ground feed at any time.

The house is well lighted throughout, and has a complete plumbing installation, supplied by a small rotary pump driven by a Westinghouse 1/3 h.p. motor. This pump delivers into a 3 ft. by 6 ft. pressure tank. In the laundry is a combined washing machine and wringer driven by a ¼ h.p. motor. In summer the kitchen is always cool for an electric range is used. This has three burners on top and an oven underneath. In winter, too, there is no fear of fuel shortage, and no delay should the range fire go out. Other household equipment is an electric iron, a sewing machine motor, and an electric vacuum cleaner. In the garage is a motor-driven grinder which keeps tools sharp.

Mr. Oltrogge has a farm of 320 acres, on which he usually feeds 150 head of cattle and 300 hogs. His electricity bill totals \$8.00 to \$10.00 per month. Current is purchased from Tegtmeier Bros., who operate a 2300 volt distributing system. As is customary in this community, each user pays for his share of whatever line connects with the nearest distributing line. He also pays for his transformer (in this case a 7½ kw. Westinghouse) and protective devices. Tegtmeier Bros. install the meters. The rate for current decreases with the amount used, thus making it easy for the farmer to run several motor driven devices. By their aid it is possible for Mr. Oltrogge with the help of one boy, to take care of his stock during the winter alone and in the summer to concentrate his time on really productive work.

In order to take full advantage of the latest electrical installations in canning and packing establishments the article on "Electricity in Fruit Packing," which was scheduled for this issue of the Journal of Electricity has been postponed to a later date and will appear subsequently in an early issue.

Selling the Farmer

BY RICHARD E. SMITH

(The type of salesmanship which is successful with the housewife may not be successful with the business man. In the same way the farmer has a particular outlook and a particular set of circumstances which must be taken into account by any salesman who would achieve success in a rural district. The author of this article is District Agent for the Mt. Whitney Power and Electric Company of Visalia, California.—The Editor.)

Now that the thoughts of the commercial world are turned towards the problems of reconstruction and the development of business in fields which formerly may have been overlooked, many of us are looking to the farmer as a consumer whose trade is desirable. This is particularly true in the electrical industry.

Many of the problems we are facing are also shared by the farmer. To him, the shortage of labor is very real and he will respond readily to any appeal which promises the more efficient and economical handling of his work.

This is not an attempt at a psychological study nor is the subject treated with any claim for authority. It is merely a series of opinions on the business methods of farmers based on the personal experience of one who has spent several years as the representative of a central station in a territory which is almost entirely agricultural. While these notes apply particularly to the electrical business, no doubt many of them cover other lines as well.

For convenience, the different phases of the subject will be treated in the order of their occurrence in a typical transaction, commencing with the "approach" and closing with collections. Before doing this, however, let us try to answer the common question, "Why is the farmer such a poor business man?"

The Farmer as a Business Man —

The average farmer is just as good a business man as the average in any other occupation; the trouble is that he has more responsibilities than the other average man.

Take a thousand men in the city and classify them. We find clerks, mechanics, street-car operators, laborers, policemen, letter carriers, teamsters—men whose native ability and acquired knowledge would not carry them far in the mazes of modern business. A very few in the thousand would come under the heading of "good business men."

Now take a thousand men in the country and note that each has to qualify as an all-round manager, who, in addition to the routine of raising crops, must frequently decide problems in law, accounting and finance. Looked at in this way the farmer grades higher than his city brother.

The Method of Approach —

In approaching any farmer as a "prospect" we should remember several things. An outstanding characteristic of people who live in rural districts is their extreme leisureliness. In the city where men crowd a day's work into a few hours we are accustomed to rapid action and quick decisions. The farmer's opportunities for social intercourse are limited and any business call is likely to develop into a lengthy visit.

A salesman who can talk intelligently about weather, crops and prices will find such small talk an excellent approach. If he knows something of Holsteins, Poland-Chinas and Hairy Peruvian, so much the better. Obviously, he should keep in an optimistic strain and avoid such subjects as grasshoppers, alkali, taxes and milk fever.

Another characteristic of the farmer is his wariness. There is a reason for this. For generations the rural districts have furnished a great harvest for the faker. Stock swindlers, quack doctors, lightning-rod agents and others of the smooth-tongued tribe have looked to the rustic as their rightful prey. As a result the farmer considers everyone guilty until proved innocent. Simplicity of dress and demeanor is the best method of overcoming this.

The Importance of a Reputation —

Any concern entering new territory must establish its integrity before it can expect many sales, and this is particularly true in the country. The fact that your company is generally known for square dealing, prompt replacement of defective parts and freedom from haggling, will lead to more sales even though the competing line can show certain alleged advantages over yours. "Bill Brown bought one of your seeders three years ago and it hain't never give him a bit of worry, and you know how Bill treats his stuff, leaving it under the oak tree all winter." Such earnest talk is music to the salesman's ears. When a farmer is considering the purchase of a new device he will speak to his neighbor about it and if it is an expensive appliance he will probably mention it to his banker. If these reports are favorable, little more in the way of salesmanship is required.

It is an easy matter to over-sell the farmer and as this always leaves an unpleasant after-taste, it should be avoided. It is the writer's opinion that salesmen working rural territory should always be on a straight salary basis. Commissions are sure to lead to unsatisfactory sales. Of course, this applies only to the firm desiring to become established in the neighborhood and not to certain specialties that are universally sold on the commission plan.

Cash Payments —

As a general rule the plan of selling on installments is not the best in the country. The man who depends on one or two crops receives his income in a lump and can pay for the new device at one time as well as another. If he cannot pay cash he will probably have difficulty with time payments. Another point is that the farmer who maintains the right relations with his bank can borrow money if necessary for the purchase of an appliance which will increase his revenue or reduce his operating costs.

The cash purchase is the most satisfactory transaction for all concerned.

Farmers are unusually fair-minded. If a dispute comes up concerning the terms of a sale, one has only to ask, "Well, now, what would you consider a fair settlement?" It will be found that the farmer will make a proposal in which he voluntarily concedes something and expects the other party to do the same. And nearly always what he suggests is all that anyone can ask. The result will be a cordial feeling that will last for years and have an immense value in establishing the dealer's reputation for squareness.

All farmers like to bargain. This evidently is the outcropping of the horse-trading instinct. Some salesmen recognize this and attempt to meet it by adding something to the price so that they can make discounts as the sale develops. Such a program is entirely wrong. "One price to all" is the only safe policy, and any variation from it will lead to trouble in either the country or the city. The first sale may be a little harder, but succeeding sales will be easier as the dealer's policy of marked prices becomes known.

Collections and Credit —

The dealer's collections should be followed closely. The typical farmer is inclined to let his accounts run till harvest time even though he have the money on hand for incidental expenditures. If a bill is due on the fifteenth it should be presented at that time, and not two or three days later. A little carelessness in this respect gives the purchaser the impression that there is no particular promptness required on his part. If payment is not made there should be an immediate and thorough understanding as to when it may be expected.

As the farmer is not accustomed to giving credit information about himself, more tact is required in extracting this than is necessary when dealing with the city business man. It will also be noticed that country banks are reticent in this respect. The best credit report can be made by the salesman and will be based on his observations on the ground.

Personal Work vs. Correspondence —

To get the best results, any transaction with rural trade should be by personal calls and not by correspondence. It has already been noted that the farmer has plenty of time to visit with a salesman but he has little time or inclination for letter writing.

The same thing applies to collections. It is much better to have some one call at the ranch than to write fancy collection letters. Then if payment is not made it is possible to get reliable, first-hand information for the files.

A versatile man will handle the rural trade intelligently and produce results. The man who works according to a plan that he learned in a book or follows a scheme outlined by a sales manager, who never worked in the country, is quite apt to be a disappointment. One thing is certain—the farmer offers a big market to the producer of finished goods, and the concern that enters the field properly prepared will reap the reward.

OWNING-YOUR-OWN-HOME IN PORTLAND

(Besides being of general importance to all citizens, the Own-Your-Own-Home Campaign has additional interest for the electrical industry in view of its connection with the house-wiring plans and the "Own-Your-Own-Home-Wiring" campaigns which are among recent electrical activities. Campaign schemes are various and interesting. This is how Portland does it.—The Editor)

In connection with the Own-Your-Own-Home campaign the city of Portland, Ore., with Mayor George L. Baker as general chairman, has evolved and carried out a very effective piece of work.

Through one of their public spirited citizens they secured for one year without charge the use of a 50 by 100 ft. vacant lot in the heart of the down town business district. The General Committee was successful in getting organized labor interested to the extent of donating sufficient labor to build a large bungalow about 40 by 85 feet, ordinarily costing about \$8,500. The lumber association, plumbers, and other interests whose materials are essential to construction donated sufficient material for the building. Heat, light, and telephones were donated by the public-service corporations. The park board of the city planted the area around the bungalow with very rich shrubbery, including window boxes and sodded lawn. The bungalow was complete in all details—modern bath, large fireplace, and was completely furnished by the public-spirited furniture dealers of Portland. This building was and is now being used as headquarters for the Own-Your-Own-Home campaign. The building and grounds were finished about December 27, 1918.

In planning the opening of the campaign on New Year's Eve the committee hit upon the two ideas which were very appropriate for the occasion. One was a New Year's resolution to "Own Your Own Home in 1919." They had a number of cards printed to pass among the large crowd, and over one hundred signed up cards and left them at the bungalow the first night.

The second thought was a wedding. This offered a great opportunity for newspaper publicity. The secretary of the Oregon Industrial League assumed the responsibility of securing donations of presents from all manufacturers of Oregon furniture and food products. He was successful to the extent of having about \$1,000 in presents donated to the prospective bride and groom. The presents were placed in the bungalow, where they remained for a week after the wedding.

A popular pastor performed the ceremony and delivered a very fine sermon on the merits of the Own-Your-Own-Home movement and what it meant to the new couple to establish a firm foundation in life by building or owning a home of their own. The mayor, after the wedding, delivered a very practical address on what the home meant in stabilizing our Government. The secretary of the Oregon Industrial League, in presenting the presents to the bride and groom, gave a very live talk on what it meant to the community to use homemade products.



Handling a Solicitor Salesman Campaign

BY WALTER COX

(In view of the opportunity for obtaining solicitors opened to all contractor-dealers through the plan of the California Electrical Cooperative Campaign, this account of a successful sixty-day campaign, involving 2500 customers in one of the smaller California cities, is of special interest. The paper was one of the most important contributions read before the Contractor-Dealers' Association at the recent Santa Cruz convention. The author is proprietor of the Cox Electric Company of Santa Cruz, California.—The Editor.)

After studying the methods of the present day manner of handling a solicitor salesman campaign, I came to the conclusion that they are not far reaching or thorough enough, bearing in mind the fact that the contractor-dealer will, in the very near future, be compelled to keep a solicitor employed the year round in nearly all districts, and most especially where the central stations have turned over their



BACKING UP THE CAMPAIGN

The vacuum cleaner campaign was emphasized by this phalanx of cleaners at the entrance of the store. Strong newspaper ads and window displays were used to tie-in with solicitors' arguments.

retail business to the dealers. This being the case, a permanent record must be kept of each consumer of electricity, so that the follow-up system may be maintained by the solicitor and dealer.

We all know that a well placed appliance will eventually lead to the desire for another and that being the case, one of the objects of the solicitor salesman is to educate the public more quickly by giving home demonstrations.

Selecting Prospects

So, in order to bring this about in my own territory, I conceived the idea that we must first find out what appliances were being used in the territory, and what the various individuals were interested in. With this thought in mind, I secured a full list of meter routes with the names and addresses from the central station. These routes were given to girls with appliance literature, who made a call on every meter, and while the call was being made, a duplicate blank was filled in as to what appliances were being used, and were they satisfactory. If the one being called on was interested in any one particular appliance, permission was asked to allow a demonstrator to call at a stated time. By doing this, I have a record, in case a sale is not made, for follow-up work, and I have also created a greater desire for the appliance through the demonstration.

Advertising

While these calls were being made, strong newspaper ads were being used, also the appliances were featured in our windows as well as the central station. Unfortunately, quite a few were out at the time of the first call which necessitated covering a portion of the route the second time, but literature was left just the same.

In our vacuum cleaner pamphlet, we inserted, for reference, a list of those to whom we sold cleaners in 1918, and for this fall campaign a full list to date will be used. This, I find, is a good scheme.

All-Round Stimulation of Trade

While I was featuring cleaners, washers and ranges during the campaign, the sale of other appliances was stimulated beyond all expectations.

I might also state that 5 towns in this district have agreed to keep one man for one year between them, which insures a demonstrator a permanent position at a nominal guarantee per week.

In the past, and in a great many territories today, solicitors enter a district and, without creating a noticeable demand for new appliances, skim off the cream of trade that the dealer had previously created, thus destroying the incentive on the dealer's part to encourage a campaign of this sort.

Campaign Profits

After adding every expense that entered into the campaign, such as wages for girls, commissions to demonstrators, printing, advertising, freight and drayage, telephone and gasoline, I find that it cost 12.5% of the net profit; in other words I had a clear profit of 22.8% after cost of goods and overhead were deducted. The campaign has proved a tremendous success, not only in the matter of sales made during the campaign, but of sales made since.



IN THE BACKGROUND

Back of every solicitors' campaign, of course, must stand the guarantee of service of the store itself. Mr. Cox's attractive establishment is already well known to Santa Cruz central station customers, which fact gave his literature added force.

A Message to the Electrical Industry

BY R. H. BALLARD

(The most important message which has yet been given out by the newly elected president of the N. E. L. A. formulates the general plans of the association for the coming year—and opens up a vista of big things to be accomplished. The geographic section idea, a tentative program for committee work and a glimpse ahead to convention call for the support of every member of the entire national society.—The Editor)

One thing above all others we should earnestly endeavor to do is to carry the National Electric Light Association to the country. This will be very beneficial in inspiring real interest in Association affairs. I know from experience that an individual or company member situated at some distance from headquarters likes to hear from time to time from one or more of the officials of the Association, and hesitating to submit his matters unsolicited, if he does not hear something during the year, he feels that his section of the country has been overlooked. Let us carry to every section of the country the message of close harmony, cooperation and unity in the interest of service and of big things for the Association.

Geographic Sections.—The chairmen of our several national sections should also correspond quite freely with geographic sections and with the principal companies, where there are no sections, incidentally suggesting and urging the organization of more geographic sections. We should all of us urge in all quarters real earnest cooperation between manufacturers, jobbers, contractor-dealers and central stations. The geographic section is a wonderful vehicle for working this out to meet all local conditions.

Some of the state associations which are not affiliated with us as geographic sections are very insistent that the national convention should be rather in the form of a congress consisting of executives and regularly elected delegates from geographic sections, and Ohio, for instance, has said that on this basis they would be glad to affiliate with the national association. The state associations should not wait on the outside for this situation to come about, but if they earnestly think this is the best plan of annual procedure, they should join as geographic sections, and when a majority or two-thirds of the states of the Union are included in the geographic sections, it will be a simple matter for a decision to be reached as to the form the national meeting should take.

Company Sections.—Mr. Doherty's address at the company section meeting at Atlantic City, is worthy of serious study by us all. The possibilities along the lines Mr. Doherty suggests of large active company sections in which a certain amount of educational work will be going on at all times, including lectures, papers, etc., suggest a fine start for training men who might progress from company sections to geographic sections, and from geographic sections to national office.

Additional General Committees.—Among the big subjects which should be considered for the year and which would form a tentative basis for the convention later, are:

Electrification of Steam Railroads: This committee to handle the subject on a broad business basis. A committee of engineers to report on the purely technical features might be appointed by the technical session.

Regulation by State Commissions: This would involve a comparison of the methods used by the several state commissions in the country on such questions as valuation and the principles underlying rate of return.

Employees' Participation: The present status of welfare work and its good or bad effect upon employees, the question of employees' participation in surplus earnings, the question of employee stockholders, and the general question of labor should be handled by this committee.

Joint Technical Committee: A joint technical committee should be formed consisting of representatives from the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, and the National Electric Light Association, this committee to check up standardization and prevent conflicting ideas being adopted.

Los Angeles Convention: Let us all have in mind the advantages of holding another convention on the Pacific Coast, probably in Los Angeles. At all times let us keep boosting for the Pacific Coast Convention next year.

Committee Appointments —

Committees and chairmen thus far appointed and confirmed by the Executive Committee are as follows:

Public Policy Committee:

John A. Britton, San Francisco, Chairman
W. W. Freeman, Cincinnati, Vice-Chairman

Committee on Geographic Sections (New):

R. J. McClelland, Chief Engineer Electric Bond & Share Co., New York, Chairman
E. W. Lloyd, Commonwealth Edison Co., Chicago
L. D. Gibbs, Edison Electric Illuminating Company, Boston
Robt. Lindsay, Cleveland Electric Illuminating Company, Cleveland
J. E. Davidson, Nebraska Power Company, Omaha
H. E. Brandli, President, Mississippi Elec. Assn., Meridian, Miss.
O. H. Simonds, Dubuque Electric Co., Dubuque, Iowa
F. M. Tait, Past President, New York

Committee on Company Sections:

Frank A. Birch, Chairman, Philadelphia Electric Company, Philadelphia, Pa.

Membership Committee:

Walter Neumiller, Chairman, New York Edison Co., New York

This committee reported on July 10, a total of 409 new members including 18 central station companies.

Rate Research Committee:

Alex Dow, Chairman, Detroit Edison Company, Detroit, Mich.

Finance Committee:

Jos. B. McCall, Chairman, Philadelphia Electric Co., Philadelphia, Pa.

Lamp Committee:

Frank W. Smith, Chairman, United Electric Light & Power Company, New York, N. Y.

Relations with Educational Institutions:

John F. Gilchrist, Chairman, Commonwealth Edison Co., Chicago, Ill.

Safety Rules:

Wm. C. L. Eglin, Chairman, Philadelphia

Accident Prevention:

C. B. Scott, Chairman, Bureau of Safety, Inc., Chicago

The Commercial Section, under Chairman John G. Learned, of Public Service Company of Northern Illinois, Chicago, has mapped out a comprehensive program for the year's work, with a large number of committees appointed directly by this section.

Technical and Hydroelectric Section, Chairman, I. E. Moulthrop, Edison Electric Illuminating Company, Boston, has appointed committees for the year and is actively at work keeping big national subjects to the fore.

Accounting Section, R. W. Symes, Chairman, Detroit Edison Company, Detroit, Mich., has consolidated a number of committees and appointed some new ones for the year's work which will concentrate on standardization and on accounting relations with other associations and with state commissions.

Electric Vehicle Section, Geo. B. Foster, Commonwealth Edison Company, Chicago, is fully organized. Its transportation committee is conducting correspondence with 155 colleges, with the idea of developing further transportation engineering courses, and is considering an advertising program, strongly endeavoring to awaken central station employees to the real value of electric vehicles.

Three and One-Half Years of Achievement

BY A. E. WISHON

(The primary issue of the N. E. L. A. at the present time may be expressed as the geographic section idea. The growth and reasons for success of the Pacific Coast Section are here forcefully set forth in the clearest exposition of the present situation we have been privileged to read. The statement comes from the newly elected President of the Pacific Coast Section N. E. L. A., the assistant general manager of the San Joaquin Light & Power Corporation. —The Editor)

Here are ten forceful accomplishments on the part of the Pacific Coast Section N. E. L. A., any one of which is of sufficient importance to justify the Geographic Section idea as a means for the upbuilding of the electrical industry of the nation.

THE GEOGRAPHIC SECTION IDEA IN THE WEST

1. Has established a geographic section of N. E. L. A. having by far the most intensive membership per capita of population existing anywhere in the Nation.

2. Made possible the establishment of an electrical co-operative campaign that has cemented all branches of the industry into one harmonious whole, which is today increasing the economic distribution of electrical supplies and aiding effectively in creating a better understanding between the public served and those having this duty to perform.

3. Paved the way to the interconnection of a vast system of power lines on a scale never before attempted in the history of engineering that brought about an economic and timely service during the period of war stress.

4. Had a part in alterations of the national safety code and amendments to local regulations that were necessary and vital to the effectiveness of public safety, and at the same time of economic importance to the electrical industry in the West.

5. Has accomplished the solution of many engineering and commercial problems, such as insulator and switch design and standardization, increasing fuel oil economy and perfecting methods of sales policy of vital importance to this section of the Nation.

6. Has brought together for the first time in the evolution of the electrical industry under one roof all branches of the industry for the study of problems of common concern.

7. Has worked out a plan for recommendation to the National Association whereby the section idea can play a more vital and helpful part in the future growth of the National Electric Light Association.

8. Has formulated a specific and definite plan whereby the public may in future be the better informed on the true status of affairs electrical and utility service in the district served.

9. Has taken preliminary and definite steps in aid of railway electrification by authorizing every possible co-operative assistance to engineering investigations of a similar nature now under way in the West.

10. Has assisted in ushering in a new era of utility service in the West, wherein a fuller realization has been brought about of the responsibility of service to the public and the joy of working to the practical establishment of this ideal.

The Geographical Idea

The Pacific Coast Section of N. E. L. A. was organized at Los Angeles, California, January 6, 1917. It comprises the states of California, Nevada, Arizona and New Mexico, which form a geographical unit possessing many problems in common.

The primary purpose of this section is to secure a better understanding of electrical problems peculiar to this territory, to better the industry as a whole, and above all to render the most efficient and economic service to the public at large.

To be more specific, let me quote from the constitution the full aims and objects of our organization:

"The object of this Association shall be to foster and promote the common interests of its members and to advance scientific and practical knowledge in all matters relating to electric light and power companies. Also to establish cordial and beneficial relations with the public and kindred associations and between manufacturers of electrical machinery and appliances and the members of this Association."

Practically speaking the Pacific Coast Section was formed to get results—results that were not being obtained, but results that were necessary to the electrical industry of the Pacific Coast.

It was formed to save the N. E. L. A. from none too slow a death in these parts. This statement may appear undiplomatic—but such a state of affairs does not change the facts of the case which govern the writer, since facts are what we want.

Satisfactory Results

The constructive results obtained by this section are now matters of history in the electrical industry of the Pacific Coast—and when these results are compared to those obtained prior to the birth of our Geographic Section—no argument remains that can be advanced against the wisdom of our plan of organization.

As stated, the Pacific Coast Section was actually organized January 6, 1917. Four months later with R. H. Ballard, Vice-President of the Southern California Edison Company, (now President of N. E. L. A.) but then President of the Pacific Coast Section N. E. L. A. presiding, the first convention was held at Riverside, California. An intensive canvas of the four states California, Nevada, Arizona and New Mexico had been made, the message of "direct attention" had gone across and 1419 names appeared on the membership list—with 487 in convention attendance.

It was at this Riverside Convention that greater representation was given to Class "D" members (the master stroke of the section to date). It was here that the policy of creating a closer understanding between the four great branches of the industry—the Central Station, Manufacturer, Jobber and Contractor-Dealer—was definitely launched. From this convention dates a long line of down-to-the-minute results, and even that closer and more sympathetic understanding of the other fellow's problems—and at all times a closer cooperation of the four branches of the industry.

Cooperative Campaign Planned

It was here that the California Electrical Co-operative Campaign was created. A campaign

manned, managed and financed by the four branches of the industry—a campaign that continues to prove its original object:—

—“Better electrical service to the public, and as certain results of that service, more profit to the individuals and companies engaged in serving the people of the commonwealth of California.”

The California Electrical Cooperative Campaign is familiar to most of you, but just a few details: On this committee each branch of the industry is represented. Only \$15,000.00 is subscribed from the total industry for its support—and yet from a dream of three years ago, from a single field representative at the start, today four field men are working and approximately sixty solicitors engaged under its direction. Cooperative newspaper advertising covering most of the state is handled through this organization; and hundreds of retail stores under its helpful influence have been improved. The different branches of the industry have a better understanding of one another—better business methods have been established and better business ethics.

What splendid cooperative action under such a plan as that of the Pacific Coast Section, N. E. L. A. makes possible, is today being recognized nationally.

H. F. Jackson, President of the Sierra & San Francisco Power Company, followed President Ballard as the second president of this section, and following President Jackson—Samuel Kahn, Vice-president and General Manager of the Western State Gas & Electric Company, was elected third president of the section. The good work so auspiciously inaugurated continued under both of these later administrations; the second convention, in spite of the stress due to war conditions, opened with 400 present, and the last convention at Coronado convened with 500 present.

During the last two years several “get together” electrical dinners have each year been held throughout the state, and it is not unusual to see 300 to 400 enthusiastic electrical men from all branches of the industry seated around the common table intent upon a common problem.

A Closer National Affiliation

This is not propaganda for secession. Today on the Pacific Coast as an active Geographic Section we are more closely bound to N. E. L. A. nationally than we were as inactive individual members several years ago. We have worked out results locally, we have seen what can be done by a flexible, workable, active body. We have become convinced of the absolute necessity of a National Association—a clearing house for national problems, and through which different Geographic Sections can have contact—but we are also convinced that the Geographic Section idea for handling local problems and bringing about local personal electrical contact is a national necessity, and that the National Association for our national problems must be made workable by being made more flexible.

ELECTRICITY FOR FARMERS

(The farm is one of the most recent and one of the most important additions to the ranks of large electrical consumers. The field is increasing steadily, and it has been estimated that there are now over 100 applications of electricity on the farm. The work of the University of California Extension Division, in keeping pace with new requirements along this line, finds an interesting illustration in a course in electricity planned expressly for farmers.—The Editor.)

The use of electricity in rural districts is becoming so universal that there is an ever increasing necessity for the farmer to have a working knowledge of its principles and applications. To meet this need the University of California Extension Division has instituted a course in electricity designed especially for farmers, and planned to cover the conditions created by varying facilities in different districts.

There are very few communities in the State of California where electricity is not available. People living in the valleys are supplied by numerous power companies who are constantly extending their power lines even to remote farming districts. Those living farther up in the foot-hills of the mountains often have streams close at hand which may be made to develop electricity by means of water-power.

Since electrical power is so generally available on account of the activity of large corporations, many who live in rural districts do not need to build plants of their own in order to have electric current. The cost of power, when purchased from a power company, is less than the cost of operating a gas engine driven plant, installed on the farm. However, those who are fortunate to have access to water-power have by far the cheapest means for obtaining electricity, since a water-power plant requires no fuel and very little attention if properly installed. For these reasons it is essential that the rural engineer should obtain a knowledge of the apparatus used in transmission systems, such as transformers, transmission lines, etc., in addition to familiarity with wiring and appliances and the general principles of the application of electricity.

In presenting the course in electricity for rural use the University Extension Division aims to restrict it to that part of electricity applicable to the needs of the man who wants to know how to wire his own home, connect up his own motors, install his own generating plant and do simple calculation so that he may become comparatively independent in the handling of electricity.

The course comprises fifteen assignments covered by a complete syllabus with diagrams and problems, and lessons in a text book. It is conducted on the correspondence plan.

The first three assignments include the simple laws of electricity and a few rules to memorize. The other assignments are devoted to a study of electrical machinery and the application of electricity to rural needs.

The aim is to make the course as practical and intensive as possible, and to cover only as much of general theory as is necessary for an adequate understanding of the subject from the farmer's point of view.

Cooperation as a Bankable Asset

BY C. W. BANTA

(A business talk from a banker which gives a glimpse of the new vision in business. Not only has cooperation been decided upon as the right thing within the industry itself, but it is recognized by the banks as the foundation of good business and the adoption of these principles is an asset to the man who would establish his credit. This is the first of a series of studies in cooperation which will appear from time to time in the Journal of Electricity under Mr. Banta's signature. The author is assistant cashier with the Wells Fargo National Bank and this page formed part of his remarkable address before the get-together dinner of the California Electrical Cooperative Campaign in San Francisco.—The Editor)

The other day I was handed the pamphlet,—“The California Electrical Cooperative Campaign,—Its Organization, Progress, Plans.” I turned to the title page and read,—“An educational campaign in which the various electrical interests cooperate to improve the industry's service to the people of California.” I found that the banking profession and the electrical industry have a mutual interest—service to the people of California.

The principles underlying the effort of each of us are the same. When we discuss them we speak in a familiar tongue, I am sure. You have caught the great ethical principles that lie behind your attempt to educate, to cooperate, to improve, to serve the people of California. You have, evidently, to an extent that I have never before witnessed, grasped the great truth that “he profits most who serves best.” To make better business, you have entered a campaign to make business better.

But—how? How can this great good be accomplished?

By dragging into the light of knowledge every unprofitable practice. And by setting up in the light, that “he who runs may read”—principles, ethics, and practices that lead to reasonable success and to business happiness.

If men realized that to expose their shortcomings to themselves and to those, who, in turn, depend upon them for success, would result in the elimination of loss, and disaster—what a stampede of conferences there would be! Retailer, jobber, contractor, banker,—each would be anxious to get facts that each needs most, from those who have most to give and who would be anxious to give. Credits, Purchasing, Manufacturing, Selling, Transportation, Finance—every phase of business would be exposed and faults corrected.

A great moral truth was once expressed:

“For everyone that doeth evil hateth the light, neither cometh to the light lest his deeds should be reprov'd. But he that doeth truth cometh to the light that his deeds may be made manifest.”

The same kind, if not the same grade of backwardness is today apparent in business; that is, some men are willing to cooperate for the good of all—and many are not.

Today, business men are freely giving of their confidential information to competitors—data that a few years ago would have been considered trade secrets and good-will. A competitor's ignorance, which heretofore has been considered a distinct advantage, has been discovered to be a real menace.

Recently at a small dinner party given by a friend to several business acquaintances, a story of

a hunting adventure was forgotten at a most exciting point when one exclaimed—

“Tell us, is business becoming better or worse?”

Immediately, half a dozen questions exploded over the table.

One said—

“That is equivalent to saying, ‘is the world getting better, or is it getting worse?’”

Another Offered—

“Is civilization an improvement, or a fungus growth on the face of the earth?”

Another—

“Is life a better thing than it used to be, or is it interesting only because it is complicated?”

“What does ‘Ethical’—‘Moral’—‘Good’ imply? Is it a standard set up by the will or determination of the majority, or does some great universal law of compensation exist that the human race is striving to learn?”

“Is there really such a thing as a Law of Compensation?”

That discussion started at about seven o'clock and was only ended at twelve—because we had to go home.

The story of business progress, I believe was fully developed.

First: There appears in the universe a physical law of compensation, so finely balanced that it holds a million suns and their worlds on scales. Men early learned and felt the laws of physical force. To the earliest savage, MIGHT was RIGHT. The first business deal was undoubtedly consummated through force generated by a stone hatchet. The Law of Compensation, as yet unknown to men, rebounded with as fierce a stroke as it had originally bounded and man learned the great principle that lies underneath the proverb that—

“Whatsoever a man soweth, that shall he also reap.”

Next: Man discovered that there was a great mental law of compensation—he discovered that knowledge is power—that “the pen is mightier than the sword” and that the man with a knowledge of conditions and values could acquire that which he otherwise would have to fight for. Still, injustice seemed to be as strong as justice. Knowledge could be used to bad purpose by evil men, great harm could be accomplished. King Solomon, in commenting upon his cogitations on this subject exclaimed,

“My, how the wicked flourish!”

Gradually, there has come to be recognized as powerful, another great law of compensation—the Moral Law—that Right Is Might.

The cooperation in business that we see today is a result of appreciation of this law. It has been understood by the individual; it is commencing to be practiced on a larger scale by groups of men.

For a moment, compare these three mighty forces.

At first glance,—the Physical force. This appears to be the quickest in action and the most powerful.

On second thought—consider the power of mind over matter and it, in turn, appears the greater force.

Then again—the Moral force,—the force of facts; not mental dreams,—but truths. These mold physical forces to their purposes; they dominate all the knowledge of the Universe.

Today, we are witnessing a great change in the technique of conducting business. Business Morality, Right, Good Ethics, Clean Principles, Open Dealings, combined with expert knowledge and a physical ability to complete undertakings, are commencing to be felt to be the three essentials to a business success.

Success today can only be achieved through co-operation of its physical, mental and moral forces:

READING LIGHT METERS

(That public utility companies should educate their customers to read their own meters is the opinion of A. D. Church, district agent of the Midland Counties Public Service Corporation. It is not to the advantage of the distributors to have their customers regard the meter and the electric light bill as impenetrable and erratic mysteries, and the following article addressed to the company's customers which appeared in the Midland paper undoubtedly did much to promote good feeling toward the central station.—The Editor)

Most users of electric current seem to regard the meter with a feeling either of awe or apathy and often with distrust.

Good housekeepers who would not pay a milk bill without checking it up, do not think of reading the electric meter for themselves, or realize, that by

urging all its consumers to keep their own record of consumption by regular reading of the meter, post it in a book and compare their figures against those of the company.

Electric energy is measured in kilowatt hours. It is this unit that the meter registers and upon which service charges are based.

On the counter-face of the meter are four small dials, as shown above. The hand on the one on the left reads thousands, the next dial to the right, hundreds, the next tens, and the last one on the right, units. If it be remembered that the hand on each dial revolves in an opposite direction from that of its adjoining neighbor, the reading is extremely simple. Pictured above are the dial readings on two different occasions. Reading No. 1 being previous to reading No. 2, reading No. 1 has its pointers set in position to read 1309. The way to take this present reading is as follows:

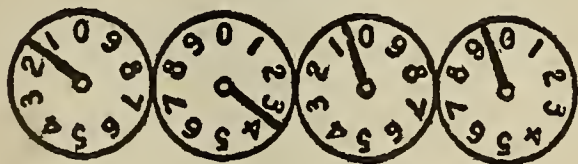
The pointer on the first right hand dial points between 9 and 0. Write down the figure the pointer last passed which is 9. Then read the dial to the left. This pointer is between 0 and 1. Write down to the left of the figure you first wrote down, the last figure the dial passed which is 0. This gives 09. Then read the next dial to the left. This pointer is between 3 and 4. Write down 3 to the left of 09 and you have 309. Then read the next dial to the left. This pointer is between 1 and 2. Write down 1 to the left of 309 and you have 1309, which is the present reading of this meter.

To find out how much current has been consumed during a certain time whether it be a month, week, a day or a few hours, all you have to do is to read the meter at the beginning and at the end of the period, and subtract the first amount from the second. In the illustration above, reading No. 2 represents the later reading which is 1521. Subtract the smaller reading from the larger and the difference is the kilowatt hour consumption, in this case being 212 kilowatt hours.

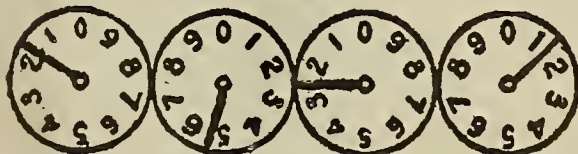
To compute your bill the following rate schedule is applied: Ten (10) cents per kilowatt hour for the first sixty (60) kilowatt hours; five (5) cents per kilowatt hour for the next one hundred and fifty (150) kilowatt hours and three (3) cents per kilowatt hour for all in excess of two hundred and ten (210) kilowatt hours.

In explanation, take the meter reading illustrated above. The consumption is 212 kilowatt hours. The first 60 kilowatt hours cost 10 cents each or \$6.00. The next 150 kilowatt hours cost 5 cents or \$7.50. The third and last block or all in excess of 210 kilowatt hours costs 3 cents each or in this case 6 cents. The total bill is the sum of the three different blocks or divisions—\$6.00 plus \$7.50 plus \$0.06 or \$13.56.

Reading
No.1



Reading
No 2



You will find that the average central station customer will feel safer and therefore like you better, if he can check your bills by reading his own meter.

taking a daily, or even weekly record, they can keep close tab on changing requirements and guard against repetitions of wasteful carelessness. The Midland Public Service Corporation, therefore, is

Are you interested in the present possibilities of trade with Siberia?—living conditions and the electrical market in South America?—hydro-electric developments in New Zealand and Japan? Then watch out for the August 15th Foreign Trade Issue of the Journal of Electricity.

Channels of Distribution from Manufacturer to Consumer

BY SAMUEL ADAMS CHASE

(If you were to take a boat trip and there were several competing lines of steamships, the fare on all lines the same—and in one case you had the choice of a modern palatial steamer with a record for speed, safety and comfort, and in the other a second-rate boat having every evidence of decay, invariably getting into difficulties,—which of these two lines would you choose for your trip? Mr. Chase, in this address before the New York State Association of Electrical Contractors and Dealers, suggests how you can make your boat the one to carry the electrical trade.—The Editor.)

The channels of distribution in the electrical industry seem to be but indefinitely marked with trade beacons of—

Trade organizations
Proper trade differentials
Proper codes of practice and ethics.

In considering this subject three important factors should properly enter into the discussion, viz.: economic distribution, effective distribution, adequate distribution; the cargo to be considered is made up principally of merchandising or resale electrical appliances and supplies, and does not include lighting or power apparatus.



Samuel Adams Chase

The various channels of distribution in the past from the manufacturer to the consumer may be divided into the following groups:

The manufacturer direct
The jobber-wholesaler
The manufacturer's agent
The central station
The contractor-dealer
The hardware merchant
The dry goods store
The drug store

and in some instances by various other merchants not strictly in the electrical supply business.

The Place of the Middleman

The manufacturer has frequently made the mistake in the past of being allured by the temptation to obtain the middleman's profit and has taken small orders direct from the Consumer at an apparent profit; but he has learned by costly experience that this so-called profit is wiped out by the cost of obtaining and handling the orders and the result is not only a net loss in money but a disturbed and unhealthy condition in the trade. It has taken years of experience to teach some manufacturers the wisdom of a policy of selling their merchandising product to the consumer through the middleman, recognizing the service rendered by the Jobber and the Contractor-Dealer.

The manufacturer has, in some instances, chosen the direct route to consumers in the past on account of the uneconomic, ineffective and inadequate distribution through other channels and a hesitancy on the part of the middleman to create a sufficient demand for the goods manufactured. Although a definite sales policy has been adopted by some manufacturers of selling direct and through the middleman at the same prices, their direct sales exceed all

others by a large percentage, notwithstanding the local influence of the middleman.

I will venture to state that the average manufacturer will welcome the day when it will be possible to economically and efficiently distribute his merchandising product exclusively through the Electrical Jobber and Retailer (Central Station and Contractor-Dealer); but these channels are not yet deep or broad enough or sufficiently safe and efficient to warrant any manufacturer with a large sales organization in the field selling exclusively through the Jobber and Retailer.

The Jobber

The Jobber or Wholesaler has done in the past, and in some instances still does a retail business in addition to a wholesale business, selling to other jobbers, to central stations, to Contractor-Dealers and to Consumers sometimes. I regret to state, he sells to Consumers without recognizing in the form of a differential, the service rendered by the Contractor-Dealer; in other words, sells to the Consumer at the Dealer's price, which practice is not only unethical but demoralizes the Contractor-Dealer business to such an extent that it makes that class in the industry seemingly distrustful. Quite naturally this has a tendency to prevent the Contractor-Dealer engaging in the retail business, hence retarding sales and expansion.

The Jobber of the past has been somewhat like many Manufacturer's Agents and has shipped an order calling for a miscellaneous lot of goods from the four corners of the earth direct from the various manufacturers to the Contractor-Dealer or Consumer because he does not carry a sufficient stock in his warehouse, thus causing delayed and expensive shipments. But the Jobber of today assembles all these goods in his own warehouse and distributes for the Manufacturer complete, in one shipment, which is of great advantage to the Contractor-Dealer. Therefore, the Jobber can be the natural, economic and efficient channel of distribution from the Manufacturer to the Contractor-Dealer.

The Manufacturer's Agent

The Manufacturer's Agent's policies vary. Some carry a small stock and ship and invoice customers, while others carry no stock and are simply order takers for the Manufacturer. Some sell indiscriminately to Jobbers, Contractor-Dealers, and Consumers, and should in reality be classed as salesmen for the Manufacturer, who has no sales organization in the field.

The Central Station

Central Stations have been pioneers in the sale of and distribution of incandescent lamps, and that

channel was marked with beacons of free renewals and cut prices, luring the industry to disaster.

Now the channel has shifted to the Jobber, Contractor-Dealer and Central Station, with the percentage going to each clearly marked with beacons of ethical merchandising and intensive selling, producing absolute fairness in competition between the competing groups. The Contractor-Dealer with a well-located attractive retail store now plays an important part in the channel of distribution of lamps from the manufacturer to the consumer.

The flatiron, washing machine and vacuum cleaner and other household appliances were introduced principally by the Central Station who did the pioneer work on these appliances as well as on incandescent lamps. It is my belief that the Central Station on account of its organization, prestige, financial responsibility and desire to add kilowatts to its lines, will always be the logical pioneer, and pilot the way for the Jobber and Contractor-Dealer on household current-consuming devices. It would be very unfortunate for the manufacturer and for the consumer if the Central Station should go out of the retail business conducted on an ethical basis, and most Central Stations will always carry the introductory or development expense of placing new current-consuming devices on the market.

The Hardware, Dry Goods and Drug Stores

The Hardware, Dry Goods, Drug Store, and other kindred merchants have probably done more to advertise electrical merchandising products than other distributors, but I do not always approve of the character of their advertising because, like former Central Station advertising, its principal story is "cut-prices."

Each of these groups, however, creates and obtains a certain amount of business which ordinarily could not be obtained by strictly electrical concerns, principally because these merchants make it easy for the housewife to obtain electrical appliances, their stores being attractive, located in the shopping district frequented by ladies, and in charge of an efficient sales organization. They will continue to increase their electrical departments and sales, and will attract the manufacturer as one of the most efficient and economic channels of distribution to the consumer, unless the Contractor-Dealer becomes alive to the situation and the necessities of the public, and parallels the methods of these merchants.

The beneficial results from a plan of scientific merchandising, practical trade cooperation and organization advocated by W. L. Goodwin, will unquestionably result in making the specialized electrical retailer, whether he be Central Station, Jobber, or Contractor-Dealer, the dominating channel of distribution from the manufacturer to the consumer.

The Contractor-Dealer

The Contractor-Dealer has not until recently become a merchant. All branches of the industry have tended to regard him as a necessary evil rather than an economic necessity. While classes in the industry have been cultivated to a high degree, the Contractor-Dealer until recently has been allowed to drift, unaided, uncultivated, and looked upon as a

parasite. The Contractor-Dealer, because of these facts, and realizing there was no stability to the prices of merchandizing appliances or wiring devices, has not taken advantage of the opportunity presented and opened a sufficient number of attractive retail stores and the channel of distribution from the Manufacturer to the Consumer via the electrical dealer route has made it difficult rather than easy for the housewife to purchase electrical appliances.

The Open Meeting

The open meeting of the Contractor-Dealer is a necessity, and is commanding the respect of Manufacturers, Jobbers and Central Stations. I hope the time will come when every Contractor-Dealer will be a member and attend all State Conventions, and will include at these meetings representatives of Manufacturers, Jobbers, Central Stations, Architects, Engineers and the Press so that each can appreciate and understand the problems of the others.

The trade, like the flow of a river, seeks the channel of least resistance: the extent to which the Contractor-Dealer develops his business ability, the location and character of his store, the support which he gives to his trade associations, the manner in which he conducts his trade association, the character of the officers of his association, the conduct and manner of presentation of his trade problems through committees when dealing with the Manufacturer or Jobber, all tend to remove barriers from the Contractor-Dealer channel and direct the flow of trade.

Now, the Manufacturer is faced with the choice between certain channels for the distribution of his product: in one channel he has the palatial department store, well managed, with unquestionable credit standing; then he has the Central Station and the Jobber, and against this he has the Contractor-Dealer, who in the past has not always appealed to him in a favorable light as compared to the others. But with the methods they are now employing, attractive retail stores, located conveniently for the buying public, intensive sales methods, improvement in organization, proper presentation of problems through able committeemen — with all these presenting forcible rather than arbitrary arguments to attempt to force the flow of trade, the Contractor-Dealers are every day commanding a higher respect from Manufacturer, Jobber and Central Station, and are causing them all to think and to think hard. If they continue along these constructive lines, the result must be an increasing percentage of business flowing from the Manufacturer through the Jobber-Contractor-Dealer channel.

In conclusion I would suggest that in the channel of distribution in which the Contractor-Dealer navigates, the beacon be labeled

Organization
Cooperation
Ethical Merchandising Policies
Determination

With these slogans properly applied there can be but one answer and that is the Contractor-Dealer ship will be the flag ship and lead the squadron through the channel of distribution from the Manufacturer and Jobber to the Consumer.

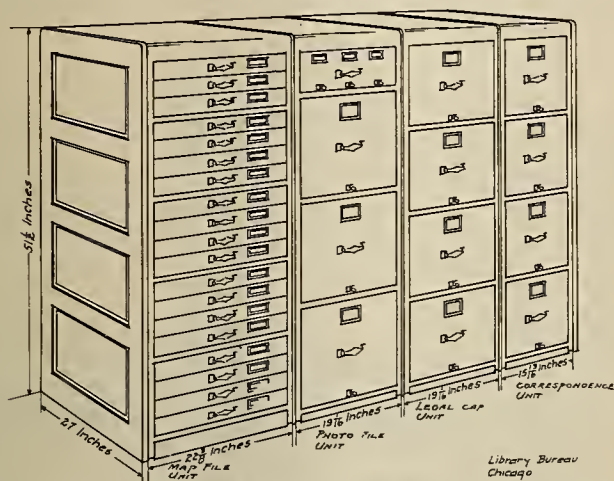
The Business Library

BY LOUISE B. KRAUSE

(In choosing the equipment for the business library, the first thing to do is to ask the advice of an expert. The question of shelving, of catalog files, and of the library room itself is here discussed from the vantage point of the experience of the librarian of H. M. Byllesby & Co., Chicago. The article is the ninth of a series on the business library which has been appearing in these columns. Attention is called to the necessity for written permission in reprinting the articles.—The Editor.)

MECHANICAL EQUIPMENT FOR THE BUSINESS LIBRARY

It is the purpose of this article to give an outline of the equipment required by the business library to adequately do its work. Some business men make the mistake of thinking that the mechanical equipment which they purchase will make a satisfactory library, while others put their faith in employing a librarian who they expect will create library serv-



THE FILING CASES

Only unit type filing cases should be considered, whether of wood or metal. As a rule wooden cases are more satisfactory both because of appearance and because they are less noisy.

ice with the the expenditure of very little money for facilities and tools for carrying on the work.

Both opinions are wrong, for the business library needs adequate equipment with which to perform acceptable service quite as much as it does a skillful librarian.

Floor Space and Shelving

No business firm should consider establishing a library service unless it is willing to provide suitable space for it, for the best librarian in the country cannot give satisfactory service with books and material scattered in various places, wedged in tightly and stored on top shelves or in storerooms where there is not quick access to them.

The writer knows of several business firms, who from lack of sufficient library space store their periodicals, and as far as any real use is concerned they might as well not have them. Often the plea of lack of floor space is a superficial reason and only indicative of the fact that the firm is following a short sighted policy and has not really waked up to the tremendous value of having such material in order and readily accessible.

In selecting floor space for a business library a square or oblong portion of space without columns or jogs in the walls is preferable, as it permits of the

most economical arrangement in putting in the required fixtures. Good daylight is of course most desirable but if this is not possible, care should be taken to have artificial light of high grade which can easily be provided by a system of indirect electric lighting supplemented by drop light wherever necessary.

The library floor space should be completely covered with cork carpet both for cleanliness and quiet, and it should be laid before any shelving is set, in order to avoid cuts and seams which catch dirt and also look bad if the carpet is laid after immovable fittings have been installed.

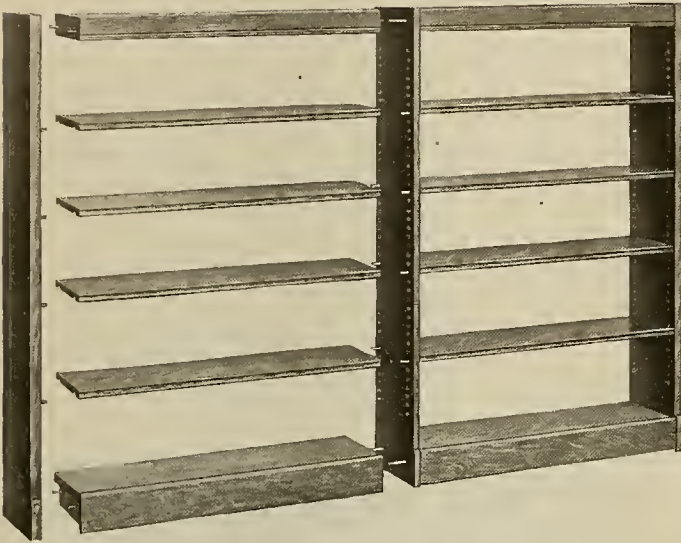


LIBRARY BUREAU UNIT DOUBLE FACED UNIT WOOD SHELVING
Such dust as does collect upon books on the open shelves is easily removed with a vacuum cleaner—and there is a great saving in space over covered shelves

In placing shelving for books, the most economical and compact arrangement is the stack plan, i.e., double faced bookcases set at right angles to a wall space and as close together as possible, but allowing ready access by narrow aisles not less than three feet wide between the tiers. The remaining wall space may be utilized by vertical files or wall shelving to supplement the capacity of the stack layout, but no business library of any considerable size

should be laid out on the plan of wall shelving only, as it is a most unnecessary waste of space.

The space assigned for the business library should be primarily selected to accomplish best the work the library is designed to do, and this principle is entirely compatible with a dignified and attractive library layout, if it is done by someone who has



LIBRARY BUREAU UNIT WOOD SHELVING

Not only are these shelves more compact and less expensive than unit type cases with glass doors, but the shelves are adjustable to the height of books.

both a knowledge of the work of the library and of the most approved library equipment.

Shall the library stack be wood or metal, open or enclosed with glass, and shall it have fixed or adjustable book shelves? Open metal stack, 7 feet 6 inches in height, with 7 adjustable shelves, 3 feet long, eight or 10 inches wide, in each tier, or open wood stack of the unit type, 6 feet 10 inches high, with adjustable shelves are both suitable, with a preference for wood, because it ordinarily costs less and looks better in a small library room. Some business offices which have only a few books are using wood bookcase units with sliding glass doors. These answer the purpose for very small collections in private offices, but if there is to be any real growth they constitute too great an expense in proportion to the number of books shelved, and are not economical in saving floor space. Even when such wooden units are placed together in double stack form they are not comparable in economy with metal or open wood stack because they are less durable, hold a less number of books per shelf, can not safely be built up to as great a height and do not save space by having adjustable shelves for books of varying heights. Glass doors to bookcases in a live business library are a pest and the only service which they really perform in keeping out a little dust does not compensate for their added expense especially when dust can be readily removed from open shelves by the use of a vacuum cleaner.

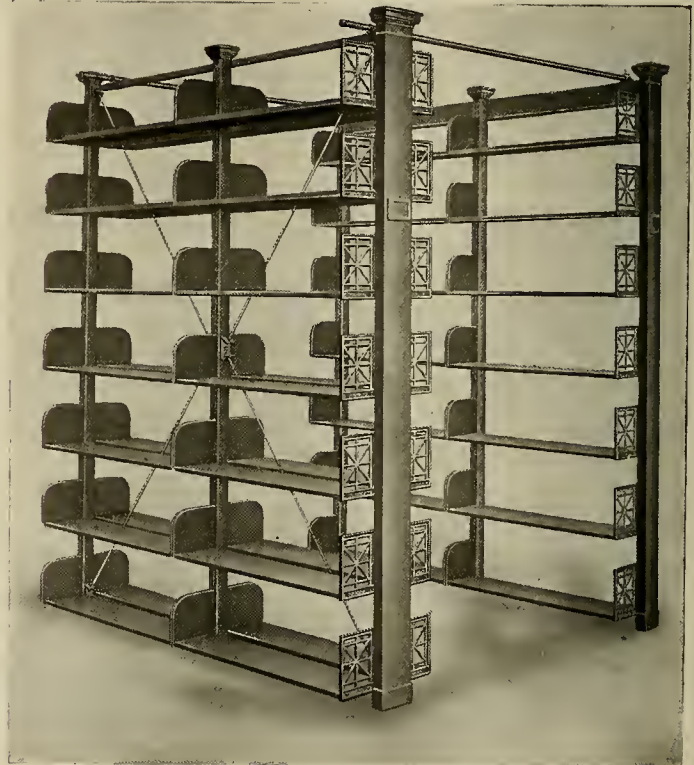
The best method for a business firm to pursue in acquiring the most suitable and best arranged shelving for a library is to have their librarian ask one or two reputable firms making a specialty of library fittings to furnish drawings, descriptions

and prices of their stock, and also make suggestions as to its best arrangement in a given floor space. The trained librarian who has been educated in the details of good and poor equipment and who knows what an adequate layout should be, will readily point out the merits and weaknesses of the specifications in regard to standardization, simplicity and price. It is always economical to equip even the smallest business library with a high grade standard make of shelving, which will never have to be discarded as the library grows, and which can always be matched when additional shelving needs to be purchased.

It must be remembered also that the business library is often not permanently located in a particular space because the layouts of all offices of business organizations are subject to change, due to growth in the business, and therefore library shelving which is well made, and of standard parts and which can be moved readily as occasion demands is most desirable.

Vertical Files

The floor space for the business library should not only provide for adequate shelving, but should allow for vertical files and their growth. The value of adequate vertical filing equipment can not be overestimated, because so much of the working material in the business library must be kept in vertical files. It is essential that drawers move easily and quietly



LIBRARY BUREAU ADJUSTABLE METAL SHELVING

The stack plan for double faced bookcases set at right angles to the wall is the most economical and compact arrangement for the business library

and do not get out of order, as this affords a great saving in labor as well as quick service for the busy man who wants the contents at his immediate disposal.

There are a large variety of makes of vertical files which are bewildering to the average purchaser in their rival claims for superiority. What the pur-

chaser needs as a guide is not a long list of all the makes of filing cabinets on the market but a brief comment on the kinds of cases which are worth while and the reasons why they are satisfactory.

In order to allow for growth, filing cabinets of the unit type only should be considered, as this type provides for expansion by the addition of new units, for flexibility, in that the units may be easily rearranged as new units are added, and for economy of space in that the greatest variety of drawers or files will occupy minimum floor space.

There are two kinds of unit filing cabinets, namely, the horizontal type in which cabinets are placed one on top of the other, with removable top, and the vertical type in which units are placed side by side, with detachable ends.

Excellent illustrations of the various useful combinations possible with both types may be found in the trade catalog of the Library Bureau, entitled "Unit Filing Cabinets in Wood."

The mechanical operation of all file drawers should be the best obtainable. Trays should be rigidly made and yet light enough to be easily handled. Vertical filing drawers should be mounted on roller bearing slides in order that they may run easily when loaded, for as one manufacturer states, "The efficiency of every card and filing system depends directly on the ease and precision of the mechanical operation."

If wood cabinets are selected, care should be taken that these are purchased from a manufacturer who will guarantee that the woods used are well seasoned and perfectly kiln-dried so that there will be no shrinking, swelling or warping. These are necessary qualifications which can not be assured when purchasing the lower priced cases on the market.

Wood cases are preferable to steel for library use, not only because of the appearance, but also because they are less noisy. Steel cabinets, despite the rubber protectors or buffers which do not wear for any length of time, are noisy. The fire resisting qualities are negligible as an argument for their use in the average business library.

Card Catalog Cabinets and Cards

All card cabinets for library use should be made for the standard centimeter size library catalog card which is approximately 3 by 5 inches and should be purchased with round rods to pass through the lower margin of the card, so that the cards can not be accidentally spilled out or carelessly removed and misplaced.

A good quality of card should be selected, for experience proves it is a waste of time and money to put permanent records on a poor grade of cards; guides with celluloid tips are more durable than bristle board ones.

The best cards on the market have both evenly cut edges and sufficient stiffness to permit rapid fingering and are made of durable stock. These points are particularly emphasized because one of the faults of many business offices is the buying of cheap card supplies without taking into consideration the reason why more expensive cards are really the most economical.

No matter by whom the equipment and supplies of a business organization are ordered, the business librarian should always have the privilege of specifying grades and makes if the best results are to be obtained. It is never advisable for the sake of general office uniformity to force supplies upon the business library which are not best suited for its work, and the librarian is always the best judge of the most suitable ones by reason of trained judgment, and experience.

A few well known firms dealing in library supplies are as follows:

- Democrat Printing Co., (supplies) Madison, Wis.
- Gaylord Brothers, (supplies) Syracuse, N. Y. This firm makes a variety of pamphlet binders which are used by many business libraries and are well worth investigating.
- Library Bureau, (equipment and supplies) New York City, Chicago and branches in other cities.
- Art Metal Construction Co., (equipment) Jamestown, N. Y. and branches in other cities.

Refer also to advertisers in the periodicals, "Library Journal" and "Public Libraries," which may be seen at the Public Library.

Editor's Note: The caption to the left hand cut appearing on page 75 of the July 15th issue should have read "Cutter book numbers" in place of "Dewey decimal system." These numbers are here applied to an alphabetical subject file.

ELECTRIFICATION OF STEAM RAILROADS

(The following tabulation is taken from the report of the Committee on Electricity of the American Railway Engineers' Association, as it was presented at the recent convention of the association.—The Editor.)

ELECTRIFIED RAILWAYS IN THE UNITED STATES

Line.	1917, miles electric track	Trolley voltage	Kind of service, passenger and freight	Power from	Kw-hr., 1917, at power house for trains	Reasons for not using water power
Pennsylvania R. R., New York.....	97	650 d.c.	Passenger	Coal	64,290,840	None available
Long Island R. R., New York.....	208	650 d.c.	Passenger	Coal	97,382,970	None available
Pennsylvania R. R., Philadelphia.....	95	11,000 a.c.	Passenger	Coal	23,100,360	None available
W. J. & Seashore.....	150	650 d.c.	Passenger	Coal	32,825,600	None available
Grand Trunk Ry.	12	3,300 a.c.	Pass. and F.	Coal	3,913,300	None available
Northern & Western Ry.	90	11,000 a.c.	Freight	Coal	56,651,700	Coal cheaper
New York Central	253	650 d.c.	Passenger	Coal	102,585,000	None available
N. Y., N. H. & H. R. R.	530	11,000 a.c.	Pass. and F.	Coal	90,500,000	Some water pr.
Michigan Central R. R., Detroit.....	25	650 d.c.	Passenger	Coal	7,431,000	None available
Hoosac Tunnel	21	11,000 a.c.	Pass. and F.	Both	7,727,000	
Baltimore & Ohio, Baltimore.....	8	650 d.c.	Pass. and F.	Water	6,200,230	
Chicago, Milwaukee & St. Paul R.R.....	600	3,000 d.c.	Pass. and F.	Water	124,600,000	
B. & A. & Pacific.....	90	2,400 d.c.	Freight	Water	23,408,270	
Erie (Rochester Division)	38	11,000 a.c.	Passenger	Water	1,894,860	
Great Northern	10	6,600 a.c.	Pass. and F.	Water	4,080,000	
Southern Pacific	138	1,200 d.c.	Passenger	Water	27,844,000	
Total.....	2,365				\$75,000,000	

The Demands of Electrical Inspection

BY E. F. HENSLER

(The value of regular inspection of electrical installations and appliances in their relation to safety standards is not always fully appreciated by the various branches of the industry. A member of the City Department of Electricity, San Francisco, tells here some of the history and aims of the Inspection Department, and the problems which the electrical inspector encounters in the discharge of his duties. The material is from a paper read before the San Francisco Electrical Development League.—The Editor.)

In the early eighties, when the electrical contractor first became necessary to the industry, the electrical inspector was unknown. As the electrical industries increased, so did the number of contractors, and so also did the fire hazards, until the Fire Underwriters found it necessary to form some rules to check the increasing menace.

The Coming of the Electrical Inspector —

About 1890 or 1891, the late Geo. P. Low, the first electrical inspector for the Pacific Coast, entered upon his duties. At first there were no expressions of joy from the contractors—quite the contrary—but, as time went on, his efforts were appreciated more and more, and in 1893 the first set of codified rules was published.

Unfortunately the territory became too great for one man to cover, and while some installations received inspection the greater portion did not. The contractor was worse off than ever, and in most cases he had to come down to the level of the uninspected work. To make matters worse, about 1895, the Underwriters discontinued having an inspector for electrical installations only, leaving the contractors at the mercy of so-called electrical experts and inspectors. Under this regime there were occasions on which contractors who really had given the best that could be had at the time, found it necessary to ask protection of the Underwriters. That condition existed until 1901, when, as one of the provisions of the Charter of 1900, the Department of Electricity was created, and our municipal inspection became an established fact.

Inauguration of the Underwriters' Laboratories —

But there was another part of the industry that was experiencing trouble also—the manufacturer. Electrical appliances which would break down after being used a short time were placed on the market, and, as the hazards had been increasing on account of this condition the Underwriters again took a hand. In 1901 the Underwriters' Laboratories were incorporated—for service, not for profit—and testing laboratories were established in New York and Chicago, to standardize and test all electrical appliances.

The Chicago Electric Code —

Since 1905 the National Board of Fire Underwriters have published every two years the National Electrical Code Rules, for the installation of electric wiring and apparatus, and semi-annually, a list of appliances that have passed the standardized tests. In March, 1914, Ordinance No. 2582, for the provisions of which the Contractors' Association was largely responsible, became effective. The provisions of Section "E" are that appliances and the installations thereof must be according to the best known

standard. What better standard can there be than the National Electrical Code, the rules of which are based on data gathered from all parts of the United States? San Francisco has no local testing laboratory, and if it had, it could not improve upon the laboratories in New York and Chicago, which have had eighteen years' experience, and the standards of which are recognized throughout the country.

The department has an up-to-date index of all electrical appliances which have passed the Laboratories' test, as well as of those from which their approval has been withdrawn for various reasons. These cards are issued when tests are completed, for the guidance of the inspectors, or of any one who may wish to avail himself of the information.

The Function of the Inspector —

When an installation is reported and an inspection is requested, what else can an inspector do, but note and report any portion of the installation that does not come up to the standard that has been set? Is he to be condemned for only obeying orders? It would be far better to commend his efforts in finding defects which might otherwise have escaped notice. It would be to the advantage of the contractor and the community as a whole to cooperate with the Chief of the Department and insist on better and more frequent inspections. The personal element must not and does not enter in.

Inspections in Moving Picture Theaters —

Largely through the efforts of the Inspection Department, the hazardous conditions that existed in the death-traps which were called operating rooms some ten years ago, have almost ceased to exist, but they still require inspection. About a year ago a systematized plan was devised for their re-inspection, but, on account of increased calls for reported work, and the fact that the force of inspectors had been reduced, this plan had to be abandoned.

Insufficient Number of Inspectors —

In the budget for the fiscal year 1919-1920, notwithstanding the fact that the work reported has increased fully 75% since September, 1918, no increase has been provided in the number of inspectors. An interesting comparison is afforded by the following record for the months of September, 1918, and May, 1919:

Month.	Applications received.	Inspections made.	Approvals.	Left on file.	No. of Inspector days.	Avg. approvals, per Inspector day.	Avg. inspections per Inspector day.	Avg. inspections for each approval.
1918. Sept.	598	1416	659	1355	89½	7.07	15.81	2.14
1919. May	1014	1796	842	1500	117	7.19	15.23	2.12

The local department is unable to make any re-inspections of work installed except when its attention is called to existing hazards. In one case, on investigation, it was found that over 50 motors had been installed, totaling over 600 h.p., none of which had ever been reported or inspected. The installation proved to be extremely hazardous and is now being remodeled.

On still another occasion a little chance information gained from the representative of a firm caused an inspection, and the report stated that the same firm had installed five or six motors. A search of the records failed to disclose a report of any kind, and the entire installation will have to be remodeled. Who is to blame, the contractors or the inspector? On the other hand, there is hardly a contractor but has profited by these re-inspections.

MOTORS IN A WOODEN WARE PLANT

BY A. B. PRAENER

(The extensive use of electricity in manufacture involves a number of large and interesting installations. The following data from the Northwest describes in detail the equipment planned for a plant engaged in the manufacture of wooden ware.—The Editor)

An idea of the extent to which electricity is used in a modern wooden ware plant is to be gained from the following survey of the motors in use at the North Portland Box Company's plant at Portland, Oregon.

The following motors are all of the induction squirrel cage type. Motors are wound for 220 volts, 3 phase, 60 cycles. Starting compensators are furnished with all motors of over 5 h.p. and all compensators are provided with overload relays and no voltage release coils. All motors of 5 h.p. and under are provided with a fused oil switch similar to the Condit Electrical Mfg. Co's Type "T" oil starter.

Motor Driving Log Haul.—One 100 h.p., 600 r.p.m. motor without rails or pulley but with flexible coupling. One half of the coupling is keyed to the motor shaft, the other half bored 3-7/16 in. and keyseated.

Motor Driving Small Splitter.—One 20 h.p., 720 r.p.m. motor without rails or pulley but with flexible coupling. One half of the coupling is keyed to motor shaft, the other half bored and keyseated.

Motor Driving Block Conveyor.—One 7½ h.p., 1200 r.p.m. motor with rails and pulley. The pulley is 7 in. dia., 6 in. face.

Motor Driving Heading Saw.—One 20 h.p., 1800 r.p.m. motor without rails, pulley or flexible coupling.

Motor Driving Clipper Saw.—One 5 h.p., 1800 r.p.m. motor without rails, pulley or flexible coupling.

Motors Driving Stave Saws.—Three 15 h.p., 1200 r.p.m. motors with rails and pulleys. The pulleys are 21 in. dia. by 9 in. face.

Motor Driving Refuse Conveyor From Deck.—One 5 h.p., 1200 r.p.m. motor with rails and pulley. The pulley is 7 in. dia., 6 in. face.

Motor Driving Sawdust Conveyor From Deck.—One 3 h.p., 1800 r.p.m. motor with rails and pulley. The pulley is 5 in. dia., 5 in. face.

Motor Driving Refuse Conveyor to Hog.—One 10 h.p., 1200 r.p.m. motor with rails and pulley. The pulley is 8 in. dia., 7 in. face.

Motor Driving Sawdust Conveyor to Hog.—One 7½ h.p., 1200 r.p.m. motor with rails and pulley. The pulley is 7 in. dia., 6 in. face.

Motor Driving Hog.—One 75 h.p., 900 r.p.m. motor without rails or pulley but with flexible coupling. One half of coup-

ling is keyed to motor shaft, the other half bored and keyseated.

Motor Driving Conveyor to Scow.—One 10 h.p., 1200 r.p.m. back geared motor without rails, pulley or flexible coupling. **Motors Driving Lathes.**—Three 10 h.p., 600 r.p.m. motors without rails or pulleys but with flexible couplings. One half of the couplings keyed to motor shafts, the other half bored and keyseated.

Motor Driving Matcher.—One 5 h.p., 900 r.p.m. motor without rails or pulley but with flexible coupling. One half of the coupling is keyed to the motor shaft, the other half bored and keyseated.

Motor Driving Surfacers (Bottom Head).—One 15 h.p., 3600 r.p.m. motor without rails or pulley but with flexible coupling. One half of the coupling keyed to the motor shaft, the other half bored and keyseated.

Motor Driving Heading Turner.—One 10 h.p., 1200 r.p.m. motor with rails and pulley. The pulley is 9 in. dia., 6 in. face.

Motor Driving Middle Hoop Driver.—One 2 h.p., 900 r.p.m. back geared motor without rails or pulley but with flexible coupling. The motor has a 7 to 1 reduction to make the jack shaft run about 125 r.p.m. One half of the coupling is keyed to jack shaft of motor, the other half bored and keyseated.

Motor Driving Bottom Hoop Driver.—One 2 h.p., 1800 r.p.m. back geared motor without rails, pulley or flexible coupling. The motor has a 7 to 1 reduction.

Motor Driving Hog.—One 50 h.p., 1200 r.p.m. motor without rails or pulley but with flexible coupling. One half of the coupling is keyed to the motor shaft, the other half bored and keyseated.

Motor Driving Conveyor to Hog.—One 5 h.p., 1200 r.p.m. back geared motor without rails, pulley or flexible coupling.

Motor Driving Conveyor to Hog Conveyor.—One 2 h.p., 1200 r.p.m. motor without rails, pulley or flexible coupling.

Total—434½ h.p.

Transformers.—There are three 100 kw. and three 125 kw. single phase, 60 cycle, oil insulated, self cooled transformers, wound for 2300 volt primaries and 220 volt secondaries. The transformers are complete with hanger irons and cut-outs.

Air Compressor.—There is one 20 cu. ft. portable air compressor complete with reservoir, drain cock, reservoir stop cock, hose coupling, air gauge, motor switch, fuse and fuse base, all mounted on a portable truck with piping complete. This is wound for 220 volts, 3 phase, 60 cycles.

WHAT BECOMES OF THE ENGINEER?

The following data on the occupations now being followed by the group of engineering graduates is compiled from the records of one of our largest engineering colleges. It is interesting to note that by far the largest group enter the employ of large companies, largely manufacturing and public utility enterprises.



PRACTICAL LESSONS IN ELECTRICITY

BY H. H. BLISS

(Do you know how to make a battery? Or how it is possible to determine how salty a solution is by a single electrical operation? The principles of electrolysis and of the electric battery here presented in the ninth lesson of this series, will give you a clear conception of practices in every day application. The author is head of the technical division of the Extension Department of the University of California and this course is given in conjunction with extension work.—The Editor)



Fleet of electric trucks used in Portland, Oregon, by a department store. Each wagon is driven by a single motor connected to a nickel-iron storage battery. It is reported that the service is entirely satisfactory.

ELECTROLYSIS AND BATTERIES

The word "Electrolysis" is used to indicate the carrying of an electric current through a solution. It is found that absolutely pure water is an almost perfect insulator, but that the presence of an appreciable amount of any one of a number of substances makes the liquid a fairly good conductor. These soluble substances are called "electrolytes," and they include acids, salts, and "bases" (or alkalis). Sugar is not an electrolyte.

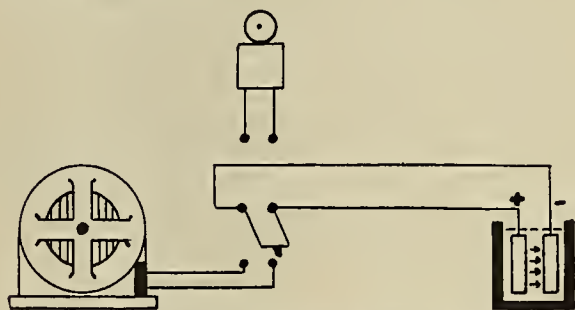


Fig. 1 The d.c. generator sends current through the liquid from the "anode" (marked "+"), to the "cathode" ("—") when the switch is down. If the plates are lead and the electrolyte sulphuric acid, a battery is thus produced, capable of ringing the bell when the switch is up.

The current is carried into and out of the solutions generally by metal "electrodes," the one where the current enters the liquid being called the positive or "anode," and the other the negative or "cathode." When the electrodes are far apart the current must pass through a long body of liquid, hence meeting high resistance; when the electrodes are large the conducting body of liquid has a cross section, which lowers the resistance. Hence in all kinds of batteries, including storage cells ("accumulators"), the effort is made to have the electrodes as large and as near together as possible, for the current must flow between them and resistance causes loss of energy.

Chemical Effects.—When current flows through

a solution, as in Fig. 1 when the switch is closed, it tends to separate and release at the electrodes the components of the electrolyte. For example, sulphuric acid is a union of hydrogen with the "sulphate ion"; when current passes through dilute sulphuric acid the hydrogen is found to collect at the negative electrode and the sulphate is set free at the anode; being chemically active it immediately combines with water there, and liberates some oxygen. This gas may appear as bubbles upon the anode or it may

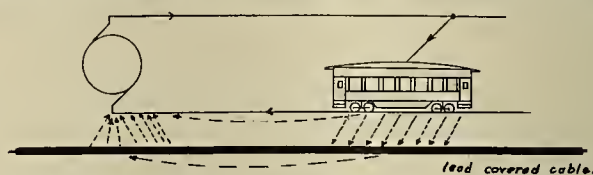


Fig. 2. Current returns to the generator by the rails and through the earth. Part of the earth current is diverted to the lead covered cable and electrolysis destroys the sheath.

unite chemically with the material of the anode; the hydrogen at the cathode may appear as bubbles or combine chemically with the material of that electrode.

In weak solutions the resistance is practically proportional to the amount of electrolyte present. This fact is utilized ingeniously by certain California engineers who determine by a single test the salinity of water in their steam boilers. A pair of electrodes fixed at a certain distance apart are immersed in a sample of the water and connected to a known voltage through a mil-ammeter. A single reading thus determines the resistance, from which is known the number of grains of salt in a gallon of water. Then water which is too impure is blown out and fresh water substituted.

Moist earth carries current readily and makes trouble between electric railway companies and the people who own subterranean piping or metal cov-

ered cables. Where a current leaves a metallic conductor (which is, then, the anode) the metal is dissolved and removed.

Storage Batteries.—If two lead plates are used as electrodes in dilute sulphuric acid and a direct current sent through the solution, as in Fig. 1, it is noticed that the arrangement soon becomes a battery, capable of sending electricity through a wire, though it was **not** a battery before the “charging current” passed. This current changes the positive electrode to “lead peroxide” by giving oxygen to it,



Salinity tester used by the Pacific Gas & Electric Company. A bottle of boiler water is brought up around either pair of electrodes and the milliammeter reads the current. The instrument is also calibrated to give a direct reading of the amount of salt present.

while the cathode remains lead. The chemical action of the acid upon the lead peroxide and the lead then causes an e.m.f. to be set up tending to send current out from the peroxide to the lead plate; the electrode by which the charging current entered the cell is the one by which current tends to go out when the cell is discharged by throwing the switch upward.

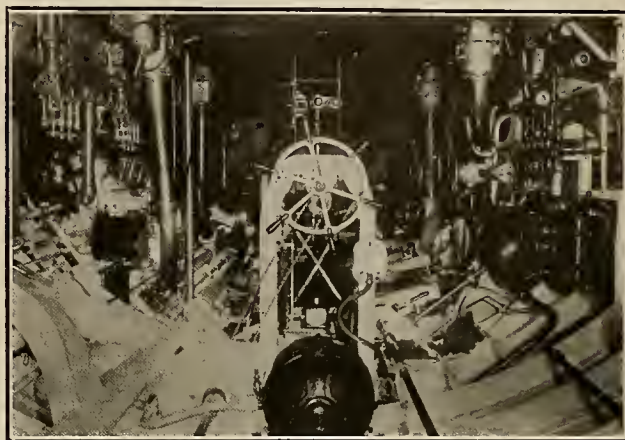
The chemical action during discharge is as follows: The hydrogen of the acid goes to the peroxide plate and takes off some of the oxygen, forming water, which dilutes the acid. The remaining oxygen of the peroxide plate is exchanged for sulphate ions, so that the plate becomes lead sulphate. Other sulphate ions go to the lead plate and combine with it, forming lead sulphate. So the sulphuric acid becomes weaker, losing hydrogen and sulphate ions; both plates become coated with lead sulphate.

Sending a charging current through again exactly reverses this action, taking sulphate ions off both plates and taking oxygen from the water to make the positive plate into lead peroxide. The sulphuric acid is increased in strength.

These lead storage cells are very widely used. They are built commercially with the active materials (spongy lead and lead peroxide) in grooves or holes upon a lead backing. One cell generally contains several positive plates similarly interconnected,

the two kinds being interspaced and prevented from short-circuiting by wood and rubber separators. A number of these cells connected together form a “battery.”

All cells of the same kind have equal voltage, the size and number of plates affecting only the resistance and the “capacity” of the cell—of course in a large cell there is more active material than in a



“Do It Electrically” is the motto aboard this submarine. Large storage batteries are charged by gas engines when the boat is on the surface and they supply power for propulsion, lights, cooking, and many other purposes when the boat is submerged.

small one, and it can give more ampere-hours before it is discharged.

The voltage of a battery equals the sum of the voltages of all the cells connected in series; if several cells are connected in parallel the pressure is no higher than that of one of them. The terminal voltage of a discharging battery is less than the generated voltage when current is flowing, just as in a generator. The current must pass through resistance in the cells themselves, and hence there is a



This small storage battery does the work of two shelf-fuls of dry cells. It is charged for a few minutes each hour by means of a clock operated connection to a d.c. circuit.

voltage drop, depending on the current and the resistance. Toward the end of the discharge the resistance increases, causing the terminal voltage to diminish rapidly. The volts per cell, when discharging, drop from about 2.1 to 1.8.

The Edison Storage Cell.—In order to overcome some of the undesirable features of the lead battery, such as weight, acid fumes, and the necessity for constant and skilled supervision, Edison invented the nickel-iron storage cell which has become popular for electric automobiles and many other uses. The

positive plate contains perforated tubes of nickel hydrate while the negative plate contains pockets of iron oxide. The electrolyte is a solution of caustic potash (chemically pure lye), which does not give off fumes. It is not changed in the processes of charging and discharging, which are chemically equivalent to transferring oxygen from one plate to the other.

The voltage of a single Edison cell is about 1.3, while the lead cell has about 2 volts. The pressure needed to charge an Edison cell is about 1.7 volts; to charge a lead cell, 2.3 volts. These figures are, of course, higher than the counter pressure generated in the cells, because the charging voltage has to overcome the voltage drop due to cell resistance as well as the voltage of the cell itself.

Primary Batteries.—Many batteries are in use in which the material of one plate is so changed and removed by the chemical reactions which cause current to flow that it cannot be restored by forcing current through the cell in the reverse direction. These are called "primary batteries" in distinction

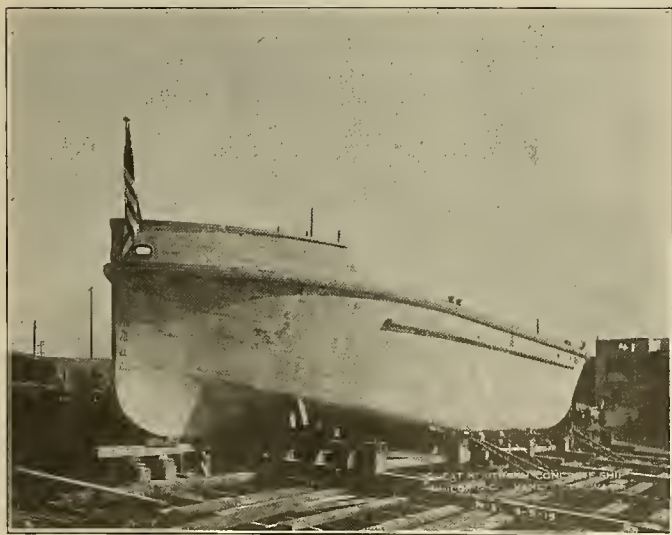
from accumulators which are sometimes called "secondary batteries." On account of its convenience and low resistance the "dry cell" is one type of primary battery very much used, and there are a number of different kinds of wet cell in use. To make a battery for experimental purposes one has only to put two pieces of metal of different kinds (or a piece of carbon and metal) into a solution of salt, an acid or an alkali. A dime and a copper cent separated by a piece of moist blotter will produce enough current to make a click in a telephone receiver. The action of such a battery depends upon the **difference** in the chemical action upon the two electrodes. Since any electrolyte acts differently upon every kind of solid conductor, any two metals (or carbon and one metal) will serve for a battery with any electrolyte. The voltage is different for every combination, varying from a very small value up to about 2 volts. The "dry cell" which has sal ammoniac for its electrolyte (mixed with some filler to a sort of paste and sealed into the cell with wax) generates a pressure of 1.5 volts.

Concrete Ships

BY J. W. SADLER

(The development of the concrete ship has done much to bring to the fore the question of electric drive for marine use. The greater weight of the concrete hull, and the consequent need for lighter equipment indicate that the concrete ship will be the electrically driven ship. The following interesting account of this latest phase of shipbuilding is from a paper recently presented in motion picture form before the Oregon Sections of the American Association of Electrical Engineers and the National Electric Light Association.—The Editor.)

The building of concrete ships may be termed a new art, and the principles and methods involved in their construction call for the cooperation and best efforts of the marine and structural engineers; the latter, of course, must be experts in concrete design.



A concrete ship ready to be launched at the Great Northern Shipbuilding Company's yards, Vancouver, B. C.

The Great Northern Concrete Shipbuilding Company, Vancouver, Washington, has under construction five concrete water tank boats for the Embarkation Service, Water Transport branch of the War Department. The boats are 100 feet long, 25 foot beam and 12 feet 6 inches depth of hold; the displacement is 500 tons. Three vessels have been

launched and were ready for trial trips about May 25th. Concrete has been poured in the other two boats, which were launched about June first.

Design —

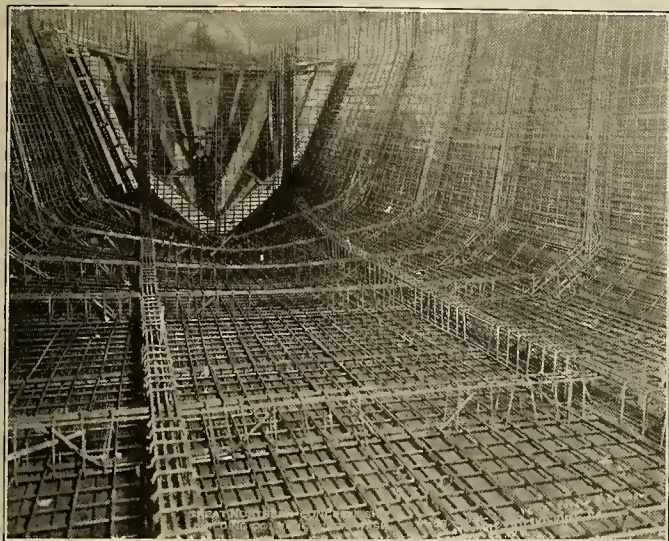
The design of a concrete hull is a most exact science, and differs materially from that of steel hull construction or that of reinforced concrete practice in building work. Concrete used in ship construction must, of course, be of higher grade than in ordinary work; higher unit stresses are permissible as the rich mixtures and high grade workmanship give ultimate crushing strength of 7000 to 9500 pounds per square inch at the age of six months. With concrete of this strength the unit stress adopted by the government on most of the concrete ships built is 1500 lbs. per square inch; however, the greatest unit stress used in designing the water carriers is 840 pounds. The unit stress for steel used is from 12,000 to 16,000 pounds per square inch; other unit stresses, such as shear and diagonal tension, etc., are considerably higher than that recommended by the joint committee; on account of the higher unit stress which is used, the ratio of modulus of elasticity is taken as 10 or 12.

In the design of a concrete ship we have the important problem of longitudinal strength, but in addition to that we must also study and design for transverse and local loads, as the fund of information and experience of many generations found in Lloyd's rules or other bureaus, pertaining to transverse framing and plating, cannot be applied in a concrete ship. The transverse frames are 8 in. by

10 in. in dimension and tankers are spaced 5 feet on centers. The bottom and side shell as well as the deck are $3\frac{1}{2}$ in. thick. There are four transverse bulkheads $3\frac{1}{2}$ in. thick with 8 in. by 8 in. vertical stiffeners. A longitudinal bulkhead is placed at midship to divide the water compartments; all bulkheads are made with proper angle fillets or haunches.

Methods of Construction —

The bending and placing of steel is one of the intricate and difficult problems encountered in building concrete ships: with a wall only $3\frac{1}{2}$ inches thick and three layers of steel, need for accurate bending and placing can be readily appreciated. Also the



The bending and placing of the steel is one of the most difficult problems of the construction. Structurally, however, the concrete ship is past the experimental stage and may be looked upon as a real rival to the steel ship.

curvature is constantly changing forward and aft, necessitating templates for each transverse frame. The centering of steel in the bottom and side slabs is done by the use of corrugated circular pre-cast concrete spacer blocks. All spacer blocks are placed within the transverse frame or beam area. The concrete blocks also help to give proper slab thickness.

In order to give any increase in the tare weight of the hull, which, of course, would decrease the cargo capacity of the boats, great care had to be exercised in building and staying the forms. The outside forms were placed first, consisting of 2 by 6 studs and shiplap lagging; precaution is taken to insure a smooth, impervious surface on the outside, and all forms are painted with form oil. The forms are all in place before concreting is commenced, except the inside sheeting between transverse frames, which is handled by placing gates 8 inches high operating in metal grooves at the transverse frames as the concreting progresses.

The concrete is mixed in a three-quarter yard mixer with side loader for charging. After being hoisted to the proper elevation it is carted by buggies over a platform running longitudinally over the center line of the boat. From this point it is run through short flexible chutes into mortar boxes, from where it is shoveled into place.

The element of mixing and placing the concrete

did not give the trouble that was anticipated, and no great elaboration of plant is required; but the narrowness and general congestion of the form work made it difficult to place the concrete in the forms. In order that impervious and dense concrete might be obtained, electric hammers striking about 2000 blows per minute were employed. These vibrators perform almost incredible feats in leading the plastic concrete around the corners of the forms. The concrete was placed in one continuous operation,—except in the deck, which was generally poured from four to six days later.

The Future of the Concrete Ship —

The future for concrete ships is, of course, a matter of cost, and competition with steel ships rests on cost per ton of freight carried. The concrete ship has passed the experimental stage and is fast approaching a point where it will be a competitor of the steel ship. Structurally the problem is solved; improvements of course will be made but the fears which were entertained by many a year ago as to the serviceability of concrete ships have been largely overcome. The future for small craft, such as barges, lighters, tenders, etc., is bright and there seems to be an immediate field for that class of work. As to large ocean-going vessels, the experience gained in building smaller craft and the use of light weight aggregate, such as artificially burnt clay or crater formations found in various localities in this country, gives promise of making concrete a competitor of the steel ship.

The three hulls launched by the Great Northern Concrete Shipbuilding Company, Vancouver, Wash., were not treated with any water-proofing preparation; reliance was placed entirely on the rich dense mixture used. The vessels have now been in the water several months and the bilge pumps have never been turned over.

Electrical Equipment —

Power is provided by two 125 h.p. distillate engines for propelling the boat and one 25 h.p. distillate engine driving a pump.

Light is obtained from a $7\frac{1}{2}$ kw., 125 volt, d.c. 2-wire generator direct connected to a distillate engine, together with a 56 cell Van Metre 20-hour storage battery. Also there is an auxiliary service on both sides of the hull, so that the boat can obtain service from an outside source when tied up at a dock, by simply plugging in on same. For controlling the system there is installed a slate switchboard, manufactured by the Western Electric Works, Portland, Oregon.

A complete system of American Bureau of Shipping's running lights are installed. Benjamin vapor proof fittings are used and Galvaducon conduct with General Electric Company's single conductor, stranded, rubber covered wire. The cargo lights are Benjamin Clusters. All plugs and receptacles are Russell and Stowell. There is installed a Tell Tail Board for the running lights. "Golden Glow," 250 watt d.c. searchlights are used. Jaggard-Sroufe Electric Company, Portland, Oregon, installed the complete electric system.

FUEL OIL AND STEAM ENGINEERING

(Economy in power plants where oil is used as fuel is a study that each day becomes of more timely importance due to the rising costs of this product and to the necessity for conservation of our national resources. Here are records in accomplishments of this nature, established in Arizona, that set new levels of attainment. The author is chief engineer of Chas. C. Moore & Co. Engineers of San Francisco. The paper was read before the recent Detroit Convention of the American Society of Mechanical Engineers.—The Editor)

A RECORD IN FUEL ECONOMY IN ARIZONA PLANTS

BY C. R. WEYMOUTH

In certain Arizona steam power plants the combination of favorable load factor and high fuel cost has not only necessitated but has also made possible the attainment of high fuel economy, and even in plants where cooling ponds are used for condensing purposes. This paper refers to the performance of three such power plants, namely, those of the Inspiration, Consolidated Copper Company, Inspiration Ariz.; the New Cornelia Copper Company, Ajo, Ariz.; and the Arizona Power Company, Clarkdale, Ariz. These plants embody many similar features. They differ, however, in methods of condensing as cooling ponds are used at the Inspiration and New Cornelia plants, and water from the Verde River at the Arizona Power Company's plant.

Plant Construction

The Inspiration plant was designed in the winter of 1913-1914. The International Smelting and Refining Company's smelter adjoins the Inspiration power-plant site, and the steam generated in waste-heat boilers in the smelter is utilized for the operation of the reciprocating blowing engines, which are designed for about 175 lb. steam pressure. These blowing engines are located in the same power-plant building as the steam turbines, and since the waste-boilers are connected to the same steam header as the oil-fired boilers, their steam pressure and the economy of the turbine plant have been limited by the common steam pressure of from 175 to 185 lb. The New Cornelia Copper Company's plant was designed in the winter of 1915-1916, and being independent of blowing engines, the boilers were selected for 250 lb. pressure. While a higher steam pressure would have been possible, the remote location of the plant and experience at the date of design led to the lower boiler pressure being selected. The Arizona Power Company's plant was designed in the winter of 1916-1917, and has boilers of 250 lb. pressure.

The Inspiration plant is 25-cycle, 3-phase, 6500 volts. The New Cornelia plant and the Arizona Power Company's plant are both 60-cycle 3-phase, 2300 volts. The maximum load at the Inspiration plant was estimated to be 12,000 kw.; three 6000-kw. Curtis turbines were therefore selected, thus giving one spare turbine. For the New Cornelia Copper Company's plant the load was estimated to be 7500 kw., and this led to the selection of two 7500-kw. turbines, one unit being a spare. The Arizona Power Company's plant was designed as an auxiliary to a

hydroelectric system, and intended to carry a peak load of 5000 kw. Owing to the quick shipment required, however, a turbine previously ordered for another company, and rated at 6000 kw., was installed, whereas the remaining equipment was selected only for a 5000-kw. load.

Boiler Equipment

All three plants have Stirling steel-encased boilers, with Peabody-Hammel oil furnaces, Green fuel economizers, Moore automatic fuel-oil regulating systems, Wheeler surface condensers, Wheeler dry vacuum pumps, centrifugal hotwell pumps, direct-connected exciters, steam-driven boiler-feed pumps, etc. Superheaters are installed in all plants, specified to give 100 deg. superheat for the Inspiration plant and 150 deg. superheat for both the New Cornelia and the Arizona Power Company's plants, all measured at the boiler, and at normal rated capacity of boilers. All the plants also have centrifugal circulating pumps, the Inspiration pumps being turbine-driven, and the others motor-driven.

The nozzles for the cooling pond for the Inspiration Copper Company's plant were furnished by one of the spray-pond companies, who also proportioned and designed the pond arrangement. The actual vacuum shown by the operation of this plant, however has been a disappointment, as a pond of insufficient area was installed. Since the design of the Inspiration plant this detail has been corrected by the addition of cooling towers. The condensate is returned to the oil-fired boilers, and make-up water for the pond is purified by a Booth water softener. A cochrane hot-process purifier purifies the make-up for the oil-fired boilers installed at the smelter. The blowing engines operate at slightly lower vacuum than the turbines, and advantage is taken of this fact to heat slightly the turbine condensate by passing through the Volz heaters in the surface condensers of the blowing engines.

Cole-Bergman water weighers and Lea recorders are installed for feedwater measurement, for computing the steam supplied from the waste-heat boilers and the steam required by blowing engines, as well as the steam consumption of the turbines. Steam-flow meters are also used for checking purposes. By this means a separate record is kept of the economy of the turbine plant on the basis of operation dependent of the blowing engines.

The feedwater for the New Cornelia plant contains from 30 to 50 grains of impurities per U. S. gallon. The water is low in calcium sulphate and carbonate, high in sodium sulphate, and very high in sodium chloride. It is not practicable to purify this water by chemical treatment. The condensate

from the condensers is returned to the boilers, and raw make-up water is used for the pond and boiler-feed make-up purposes. Frequent blowing down is required for the cooling pond, as well as for the boilers. Scale is also formed both in the condensers and the boilers, and this requires frequent cleaning, as condenser scale tends to impair the vacuum.

The Arizona Power Company uses Verde River water for condensing purposes, this being taken through a flume at such a point that the pumping head is reduced by gravity flow. The condensate is returned to the boilers, and the raw make-up water is purified in a Cochrane hot-process purifier.

Economy of Inspiration Plant

Upon the completion of the Inspiration plant it was placed in regular service. The performance of the individual pieces of apparatus was investigated

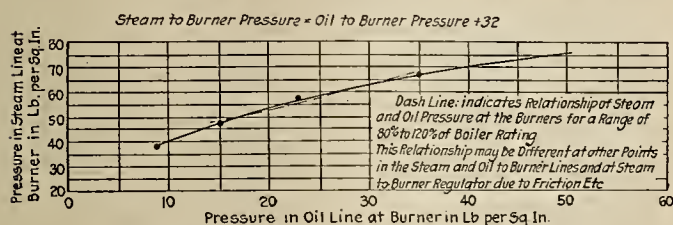


Fig. 1. Steam and oil pressure at burner lines

in order to make certain that everything was working to the best advantage, particular attention being paid to the efficiency of boilers, the adjustment of burners, furnaces, and the automatic firing system. A number of uniform load tests were made of boilers for checking purposes, and the results obtained are given in Table 1 and the curves of Figs. 1 and 2. These tests show a fairly high efficiency at rating, and, rather contrary to the usual results obtained with non-casing-set boilers, a higher efficiency at fractional loads than at rating. The higher efficiency is due to the tightness and the insulating efficiency of the steel casing. As a result of these tests, instructions were given the operators to divide the load equally among all boilers, and this of course, was done automatically by the firing system. The operators, however, were instructed to keep as many boilers on the line at light loads as could properly be fired, maintaining a fire in each of the three burners per boiler; below this load boilers were cut off the line, and only refired when the load again increased.

The curves of Fig. 1 and 2 show the relation between the steam pressure of the atomizing steam and the oil pressure, both measured in the supply pipes at the individual burner, between the throttle valve and burner. From data obtained from these curves the steam-to-burner regulator was set to give the proper pressure of atomizing steam, based on the momentary oil pressure.

Under variable load the damper controller has been able to maintain CO_2 readings varying from 12 to 14.5 per cent CO_2 , for which the corresponding excess air for normal conditions is 28 per cent and 6 per cent, respectively.

After instructing the operators, and while the plant was still under the control of the engineers,

an average economy was obtained for the month of September 1915, as follows:

Average number of turbine units in operation.....	1
Average daily load, 24-hour basis, kw.....	5980
Average steam pressure at boilers, lb. per sq. in.....	178
Average vacuum in condensers, in. of mercury, absolute.....	2.66
Average ratings on boilers, per cent.....	95
Gross boiler efficiency, per cent.....	80.9
Average economy, kw-hr. per bbl. of oil as fired.....	289
Average economy B.t.u. per kw-hr.....	21,500

In the subsequent operation of this plant by the owners the economy has been maintained practically equal to that shown under the direction of the engineers, but during the winter, due to colder circulating water, the economy is even better than indicated above. On the other hand, during the summer months, with the warmer circulating water and falling off in vacuum, the economy naturally drops to

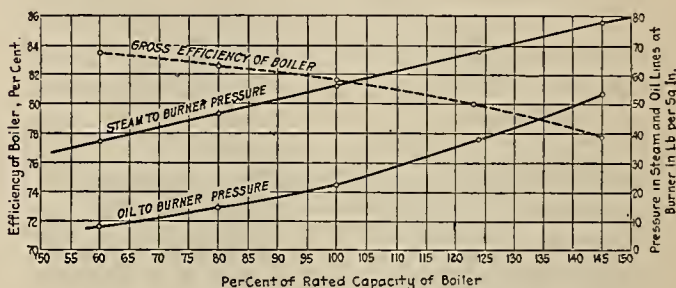


Fig. 2. Pressures and efficiencies at various loads

a lower figure than that given for the month of September.

This plant operates in conjunction with the hydroelectric plant at the Roosevelt Dam, and at periods of the year preference is given to hydroelectric power. As a result, there is a fractional load, or partial shutdown of the steam plant, and for certain months this in turn has naturally resulted in a reduced economy.

Operating Results

The operating results for the plant, furnished by Mr. W. W. Jourdin, Mem. Am. Soc. M. E., Chief Engineer of the Inspiration power-plant, are given by the curves of Fig. 3. It will be noted that the best monthly economy for winter conditions has been 294.5 kw-hr. per bbl. of oil, or 20,910 B.t.u. per kw-hr.; and the poorest economy for summer conditions for the normal load has been 257.5 kw-hr. per bbl. of oil, or 23,700 B.t.u. per kw-hr., although for the month of September 1917, due to the very light load, the economy was only 237 kw-hr. per bbl. or 25,970 B.t.u. per kw-hr. As previously stated, this plant, in comparison with non-cooling-pond plants, is subject to an accumulation of scale in the condensers, and as a result there is a slight loss in vacuum. Since purified feed-water is used, the plant is not subject to troubles from scale formation in the oil-fired boilers, nor does any loss of fuel result from shutting down boilers for cleaning or boiler blow-off.

The curves of Fig. 3 also give the operating records for combined boiler and economizer efficiency, atomizing steam deducted, this being the form in which the power-plant records are kept. A comparison of this result with the boiler efficiency tests would seem inconsistent without the explanation that the economizers at this plant heat the feedwater through a temperature range of from 40 deg. to 45

deg., whereas it will be noted that the results for the Arizona Power Company's economizers, given in Table 2, indicate a temperature rise in the economizer of 91 deg. fahr. In proportioning the Inspiration economizers with reference to the investment and fuel saving it was assumed that the average period of operation would be less than half the year, owing to the use of hydroelectric power; it was also as-

plant is such that the frequent shutdowns for boiler cleaning and the large amount of hot water which is blown off from the boilers affect to an appreciable extent its economy.

Variations Due to Climate

This plant, due to its location in the southwestern portion of Arizona, is subject to more intense summer heat than is probably any other power-plant in the western territory, and this in turn gives rise to considerably less favorable cooling-pond and condenser performance, with respect to vacuum, for the summer months than for the winter months. The vacuum performance is also influenced by the accumulation of scale within the condensers between the periods of cleaning condensers, due to concentration of salts in the cooling-pond.

TABLE 1 RESULTS OF EFFICIENCY TESTS ON STIRLING-WATER-TUBE BOILER IN INSPIRATION CONSOLIDATED COPPER COMPANY'S PLANT

Class M No. 26 battery Stirling water-tube boiler with steel casing. Heating surface per boiler, 7129 sq. ft. Rated boiler hp., 712.9 (based on 10 sq. ft. per hp.). Boiler-room floor elevation, 3615 ft. Normal barometer, 26.13 in.

	Test at 100 per cent rating ¹	Test at 80 per cent rating ²	Test at 60 per cent rating ²	Test at 125 per cent rating
Date of test, 1915.....	May 29	June 1	June 2	June 4
Number of test boiler in plant.....	5	5	5	5
Duration of test, hours.....	10	6	6	10
Temperature of feedwater entering boiler, deg. fahr.....	210.15	200.0	191.0	209.5
Temperature of superheated steam, deg. fahr.....	503.9	502.4	491.0	517.3
Deg. fahr. superheat.....	122.1	122.0	111.0	135.5
Temperature of steam to burner, deg. fahr.....	504.2	502.7	..	..
Temperature of oil to burner, deg. fahr.....	187.8	186.9	186.0	185.0
Temperature of flue gases, deg. fahr., measured across breeching outlet and in rotation	No. 1..... 466.5 No. 2..... 469.0 No. 3..... 470.1 No. 4..... 473.3 No. 5..... 472.5 No. 6..... 470.8 No. 7..... 471.3	423.7 427.5 434.7 434.7 432.5 429.0 427.0	389.0 394.0 389.0 391.0 390.0 392.0 392.0	495.0 502.0 507.5 508.0 507.5 510.5 506.0
Temperature of outside air, deg. fahr.....	95.0	90.2	86.5	69.0
Temperature of air entering ashpit, deg. fahr.....	93.1	100.3	95.0	75.9
Steam pressure, lb., gage.....	187.4	184.03	182.3	187.3
Pressure in oil line before burners, in lb., gage.....	22.0	15.0	9.4	36.8
Pressure in steam line to burner, lb., gage	Before burner valves..... 56.6 After burner valves..... 0.014	46.8 +0.016	38.0 0.013	67.0 0.005
Draft, inches of water	Top of first pass No. 1..... 0.062 Bottom of 2nd pass No. 2..... 0.076 Front of damper No. 3..... 0.076	0.080 0.070 0.020	0.032 0.020	+0.076 +0.091
Draft, inches of water (power-plant instrument), front of Damper.....	0.065	0.074	0.033	0.110
Water, per cent (by centrifuge).....	0.480	0.490	0.490	0.49
Analysis of fuel oil by Smith Emery & Co.	Trace Sulphur in per cent of dry oil..... 1.06 Carbon in per cent of dry oil..... 85.58 Hydrogen in per cent of dry oil..... 12.87 Net B.t.u. per lb. of oil as fired..... 18,540 Sulphur corrected in B.t.u. per lb. oil..... 85	Trace 1.06 85.58 12.87 18,540 85	Trace 1.06 85.58 12.87 18,540 85	Trace 1.06 85.58 12.87 18,540 85
Total water actually evaporated, lb.....	232,736	104,394	76,857	269,963
Lb. water actually evaporated per hour.....	23,273.6	17,399	12,809	26,996.3
Factor of evaporation.....	1.124	1.134	1.137	1.131
Total water evaporated from and at 212 deg. fahr., lb.....	261,594	118,383	87,386	305,328
Lb. water evaporated from and at 212 deg. fahr. per hr.....	26,159	19,730.5	14,564	30,532.8
Total oil fired, lb.....	16,743	7,498.5	5,458.5	19,907
Oil fired per hour, lb.....	1,674.3	1,249.7	909.5	1,990.7
Boiler horsepower developed.....	758	572	422	885
Per cent of rated capacity, based on work done by water-heating surface.....	106.7	80.3	59.2	124
Lb. water actually evaporated per lb. of oil.....	13.90	13.92	14.08	13.56
Lbs. water evaporated per lb. of oil from and at 212 deg. fahr.....	15.62	15.73	16.00	15.34
Efficiency of boiler based on gross evaporation per cent.....	81.76	82.64	83.74	80.29
Per cent CO ₂ in flue gas at top of first pass.....	15.5 15.6 15.6	15.17 15.41 15.41	15.1 15.0 15.0	15.1 14.4 14.4
Percentage analysis of gases at bottom of second pass	O..... 0.8 CO..... Trace N..... 83.6 CO ₂ 14.5	1.11 0 83.48 14.5	1.4 0 83.6 14.5	1.94 0 83.66 14.3
Percentage analysis of gases at front of damper	O..... 2.3 CO..... Trace N..... 83.2	.. .. ..	2.1 0 83.4	2.11 0 83.59
Per cent excess air over chemical requirements at front of damper.....	4.19	..	4.19	6.14

¹ Apparent discrepancy in the draft readings of power-plant instrument and thermometers are due to the different location of the nozzles and to slight leaks in flue-gas piping.

² On account of the waste-heat boilers and intermittent firing of the other boilers the load was very jerky. On this account the damper was fixed to a low point on the draft and the ashpit door was regulated during the test.

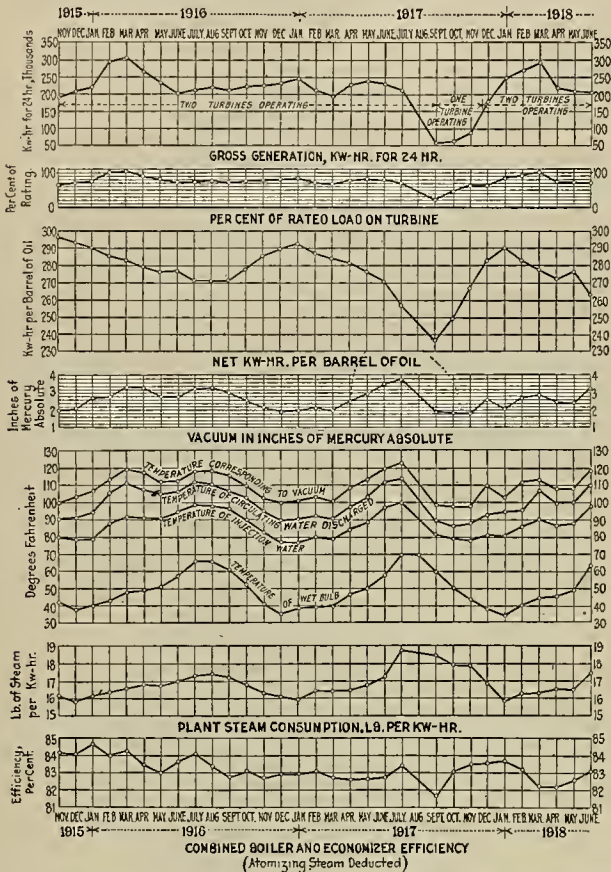


Fig. 3. Operating characteristics of the Inspiration Copper Plant

sumed that the fixed charges would be very high. This combination of circumstances, together with high freight rates and construction costs in Arizona, resulted in the selection of an economizer of comparatively small surface, giving a favorable return on the investment but a result considerably less favorable than that attained in the average economizer with oil fuel, when measured only by temperature rise.

Economy of the New Cornelia Plant

Following the installation of the New Cornelia plant in November 1917, an attempt was made by the designing engineers to check the economy of the station, but owing to the war and a scarcity of labor this work had to be abandoned before completion. While it has never been possible to show the best performance of which this plant is capable, the operating crew have, for the most part, been very efficient in handling it, except during an illness of the chief engineer, when the economy of the plant fell off to a disappointing figure. This occurred during the summer and fall of 1918, and the figures for economy for that period are thus hardly fair to the plant. It should also be borne in mind, in connection with performance data, that the feedwater condition at this

The best economy for this station, known to the writer, is for the month of January 1918, the average performance for four successive days being as follows:

Date 1918	Average Load, kw.	Economy, kw-hr. per bbl. of oil	B.t.u. per kw-hr.
Jan. 26	7921	321.7	18,975
Jan. 27	7830	324.1	18,833
Jan. 28	7725	324.2	18,829
Jan. 29	7800	326.2	18,711

The poorest economy for this station during the summer of 1917 was for the month of July, namely 293.5 kw-hr. per bbl. The average vacuum was 1.66 in. absolute and the average load 5550 kw. The poorest economy during the summer of 1918 was also for the month of July, or 287.5 kw-hr. per bbl. The average vacuum was 2.14 in. absolute, the average load 5850 kw., and consequently the economy for the summer of 1918 was abnormally low.

The monthly report for December 1918, gives the following: Average load, 7800 kw.; average economy, 312 kw. per bbl. and 19,913 B.t.u. per kw-hr. The monthly report for January 1919, gives: average load, 7790 kw.; average economy, 317.9 kw. per bbl., and 19,535 B.t.u. per kw-hr. The improvement for the month of January over December is due to a straightening out of the aforementioned difficulties experienced in the summer of 1918, and it is the writer's belief that the station will soon be operating at its best previous economy for the corresponding season.

It will be noted that the economy for the New Cornelia plant is materially better than that of the Inspiration. This is due somewhat to the larger turbine units installed, but in the main to the higher steam pressure and to the improved design of cooling pond, which results in better vacuum. In comparing the economy of these cooling-pond stations with that obtained in tidewater plants, allowance should be made for the size of turbine units, the obtainable vacua under operating conditions, the increased head on circulating pump due to the greater quantity of water which must be handled through the condensers, and the increased pumping head due to the cooling-pond nozzles and longer lengths of circulating-water line.

Economy of the Arizona Copper Company's Plant

This plant was completed in September 1917, and due to the war conditions in the mining region it was difficult to assemble a skilled operating crew. The plant was furnished under a contract covering a complete plant-economy guarantee at 5000-kw. load, and the final test, covering 48 hours' operation in regular commercial service, under variable load, was concerned mostly with the economy at this load, although a run was made at 6000-kw. load, which is the rated capacity of the turbine. The results for the final test are given in Table 2. At all times during this test the plant was subject to a variable load, due to the regulation of the hydroelectric system. The oil was carefully weighed and the electrical output was measured by calibrated meters. The electrical output given is the net useful output for the station at the 2300-volt bus, deduction having been made for the power consumption of electric auxiliaries, including lighting for the operators' cottages, circulating water pump, deep-well pump and air washer. The average electric auxiliary load was 46 kw., which is somewhat smaller than would have been the case had the entire head on the circulating water been overcome by pumping; against this condition is the fact that during the test the quantity of circulating water was somewhat less than specified, so that roughly speaking, the one condition nearly offsets the other.

TABLE 2. RESULTS OF TEST OF THE ARIZONA POWER COMPANY'S STEAM PLANT AT TAPCO, ARIZONA

Temp. of flue gases leaving economizer No. 3, deg. fahr.....	276
Duration of test, hours.....	6
Boiler pressure, lb. per sq. in. gage.....	250
Steam pressure at turbine throttle, lb. per sq. in. gage.....	238.5
Avg. temp. of superheated steam at boilers, deg. fahr.....	546
Temp. of superheated steam at turbine, deg. fahr.....	516
Temp. of feedwater entering boilers, deg. fahr.....	207
Temp. of water leaving feedwater heater, deg. fahr.....	116
Temp. of circulating water from condenser, deg. fahr.....	62.4
Temp. of circulating water to condenser, deg. fahr.....	45.7
Room temperature, deg. fahr.....	83.2
Barometer, inches of mercury.....	26.773
Vacuum in condenser, inches of mercury.....	25.783
Absolute vacuum, inches of mercury.....	0.990
Average load, kw. per hr.....	5,815
Power factor by power-plant indicator.....	0.93
Electrical Output by Integrating Meters:	
Gross kw. generated.....	34,890
Gross kw.-hr.	5,815
Auxiliary power, kw.	277
Net kw. output	34,613
Net kw.-hr. output	5,769
Oil Measurements:	
Total oil weighed, lb.	34,516
Correction due to diff. in temp. at start and finish, lb.....	46
Oil actually used, lb.	34,470
Avg. grav. of oil (analyzed by Smith Emery & Co.), deg. B.	17.65
Weight of oil per bbl. of 42 gal., lb.....	332
Heat value of oil (analyzed, by Smith Emery & Co.), B.t.u. per lb.	18,703
Economy:	
Fuel used per gross kw-hr., lb.....	0.988
Fuel used per net kw-hr., lb.....	0.996
Kw-hr. per bbl. of oil, gross	336.0
Kw-hr. per bbl. of oil, net	333.3
B.t.u. per kw-hr. gross	18,478
B.t.u. per kw-hr. net	18,628

Operating Results

It is not possible to give daily operating results for this plant, at the load for which it was designed, for since its installation it has been maintained only for reserve purposes, carrying occasional peaks but the majority of the time a very light load, and for a number of hours during an average day, with the turbine at standstill. Of course, favorable economy is not possible under such conditions, as the fuel losses due to keeping hot boilers, piping, etc., the dead-load losses for the operation of auxiliaries, and the zero-load steam consumption of turbine result in a zero-load fuel consumption of the plant which is an appreciable percentage of the full-load fuel consumption. With the foregoing explanation, the results given below for the month of February 1918, are as follows:

Total kw-hr.	1,235,580
Total bbl. of fuel oil used.....	4,783.9
Total hours of operation.....	444
Average kw. for operating period	2,800
Kw-hr. per bbl. of oil (delivered to lines, net).....	258.50
Operating period load factor	0.467
Average kw. for monthly period	1,838
Monthly period load factor	0.306

It is of interest to note that the turbine at the Arizona Power Company's plant is practically a duplicate of those at the Inspiration Copper Company's plant, having the same number of stages, the difference in the operating economy of the turbines being

largely due to steam pressure. Here, again is a marked increase in plant economy due to an increase in steam pressure, and also by reason of the colder river water at the Arizona Power Company's plant as compared with the cooling-pond water at the Inspiration plant and the consequent improvement in vacuum. All economy figures given for these plants are based on oil as fired, without deduction or correction for moisture, sulphur or silt.

The engineers have endeavored to instill in the minds of the operators of these plants and to show by example that high economies need not merely be looked for during the test period, but can be maintained during the operating period. The Inspiration plant is large enough to permit the employment of a boiler-room engineer, but, due to their smaller size, such an engineer is not maintained at the other two plants. This plant was designed on the assumption that the average load would be maintained for a period of six months only during the year, and that oil delivered would cost \$1.45 per bbl. The New Cornelia plant was designed on the assumption that oil would cost \$1.25 per bbl., but since the date of design of these plants the cost of oil has materially increased.

Personnel

The selection of the principal equipment for the Inspiration plant and its general layout were made jointly by John Langton, Consulting Engineer for the Inspiration Consolidated Copper Company, and Chas. C. Moore and Co. Engineers, which firm was also responsible for the detailed designs, installation and tuning up of the plant.

For the New Cornelia plant the entire work was in the hands of Chas. C. Moore and Co. Engineers, with the approval of A. G. McGregor, Consulting Engineer for the New Cornelia Copper Company.

The Arizona Copper Company's plant was designed and built by Chas. C. Moore and Co. Engineers, with the approval of R. S. Masson, Chief Engineer for the Arizona Power Company.

A considerable portion of the testing work on the Inspiration plant was handled by A. G. Budge, under the writer's direction, and for the New Cornelia and Arizona Power Company plants by T. B. Paulson, also under the writer's direction.

A NEW FUEL

BY H. E. LINDEN

(Fuel developments which tend to the conservation of natural resources, and which permit of the more effective use of local products, are of especial interest to the Pacific Coast where the coal is of poor grade. Such a development is the "colloidal fuel" described below. The material formed part of a discussion on California pulverized coal, and the author is of the Beckman and Linden Engineering Corporation of San Francisco.—The Editor.)

Announcement that has recently been made by the Submarine Defense Association of 141 Broadway, New York, of which Lindon W. Bates is the chairman of the Engineering Committee, pertains to the development of what is known as colloidal fuel.

This colloidal fuel consists of a liquid fuel with about 45% fuel oil, 20% tar and 35% pulverized coal, or it may also contain 75% of pulverized coal and 25% of fuel oil, eliminating the tar. Such colloidal fuel as this has actually given merchant vessels or warships upon a given tank capacity, a 20% increased steaming radius over that possible with the usual fuel oils. A medium was discovered which

would neutralize gravitation and keep the introduced heavier particles of carbon from settling. This new agent is a paste-like, greasy substance, called "fixateur." Twenty pounds of it in one ton of liquid fuel keeps the powdered coal and tar suspended in the oil and evenly distributed. Coals containing 25% of ash have been used for this purpose without any difficulty. The following is a description of the method of producing and handling this fuel, employed by the Brooklyn plant of the Standard Oil Company.

Fuel-Making Apparatus —

Adjoining the boiler room in an open area 60 feet square is the apparatus for making the colloidal fuel. It consists of a simple crusher for breaking up the coal in a dry state into a fineness sufficient for its passage through a 200 mesh screen. The fixateur is a heavy, black pasty substance of the consistency of axle grease and is the apparently magic substance which holds the coal particles suspended and equalizes the different specific gravities that go into the mixture.

The fixateur, to the amount of 1 per cent of the finished product, is placed on the top screen of four horizontal screens which extend through the entire diameter of a tank, about 20 ft. high and 12 ft. diam. The oil is entered through the top of the tank and seeps through the fixateur. The lower screens catch that part of it which oozes through the first screen, thereby holding it up where more oil can encompass it. When the oil has thus been fixated, it is introduced by pumps into the mill, which is a cylindrical tank about 2 ft. high and 3 ft. in diam., inside of which are the mixers, consisting of arms with balls upon the ends. After the fixated oil and coal dust have been thoroughly compounded, the new mixture is pumped into storage tanks, ready to be forced into the burners.

Facilities in California —

It seems that a fuel of this kind would be ideal for development in California. A by-product distillation plant could be installed at one of the coal mines which would furnish the necessary tar and in addition coke briquettes of the carbo coal variety which, if found more useful due to their high carbon content, could be used in the powdered form to be put in the colloidal fuel instead of the crude coal itself. There is reason for believing that the California coal fields will become more valuable and that this coal should by all means be substituted for fuel oil wherever possible.

Growing Demands Upon Fuel —

For our newly-created merchant marine we shall need about 32,000,000 barrels of fuel oil in the ensuing year, and our fighting fleet will consume in that time a round 4,000,000 barrels. These are merely straws which show the trend of the current of consumption. Quite half of all the petroleum mined in this country is used for steam raising, and there are parts of the United States today wholly dependent upon liquid fuel. Crude oil and petroleum derivatives are indispensable to our industrial progress and to our many other manifold activities.

Load and Diversity Factors in Retail Merchandising

BY J. E. BULLARD

(That profits in the retail business are in proportion to the rapidity of turnover of stock, and that rapid turnover should be worked for even to the extent of selling off goods at cost, are contentions which are of vital interest to the contractor-dealer. Variety in a small stock, rather than a large stock of any one article, is advocated as tending to keep up rapid turnover.—The Editor.)

Due to the fact that the operating expenses were very low a great many people gained the idea, and some still believe, that there are wonderful profits in water power developments. In practice, however, these great returns on the money invested are never realized to the full and are often not enough to pay an immediate return on the fixed charges.

Load Factor and Maximum Capacity —

This is due to the load factor. It all depends on how uniform the load on the plant can be made and how nearly the average load approaches the maximum capacity of the plant. In actual practice this is not as high as might have been expected. It is only after years of business development that the load factor can be made to approach 100 per cent.

It is the amount of current sold rather than the rate at which it is sold that determines the annual revenue, and it is a high load factor that makes the maximum sales of current possible. It is not what it costs to build and operate a plant that counts so much as it is the amount of money that the investment can be made to earn, and all this depends upon the load factor.

Some central stations have found that it paid to go so far as to reduce rates to a point which would make possible the securing of business that was out of reach at the old rates. The increased business, the higher load factor, more than made up the loss in revenue.

The Load Factor Principle in the Sale of Appliances —

In the selling of appliances the load factor principle holds as true as it does in the generating and the selling of electricity. No merchant can hope to make the greatest profits unless he can make his capital invested result in the maximum return in sales. To do this he must keep his rate of turnover as high as it is possible to keep it. A 100 per cent load factor on a central station means that the plant is constantly sending out current at the full capacity of the plant. A 100 per cent of turnover in the merchandising field means that the merchandise is constantly flowing through the store at the maximum rate and that there is never any more in stock than is absolutely necessary to render satisfactory service to the customers.

There are small stores in our large cities that closely approach this ideal condition, just as there are some central stations in the country which are more and more closely approaching the ideal. These small stores carry only enough stock to last them a very few days. They have fresh stock delivered to them every day, and since in most cases they do not pay for the stock upon its delivery they have sold it and collected the money for it before they have to

pay for it. Accordingly they are doing business on the capital of the wholesaler. In order to do this, however, they have to turn their stock something like a hundred times every year. It is hardly necessary to state that these stores are making money and that they are making money because they are turning their stock so frequently.

Turnover and Profits —

Just what making frequent and complete stock turnovers means is best illustrated by taking an example.

Suppose a man invests \$10,000 in electrical supplies and utensils, that he sells this stock in the course of a year and that he averages 35 per cent margin. By the end of the year for paying interest on the capital invested, meeting the rest of the overhead and operating expenses and yielding a profit he will have realized the following: since the 35 per cent is figured on the selling price, \$10,000 represents 65 per cent of the sales. This makes the annual sales \$15,384.61, which leaves \$5,384.61 for meeting all expenses and leaving a profit. Since \$10,000 has been invested in stock we will deduct 6 per cent on this sum, or \$600. This leaves \$4,784 that has been earned by the \$10,000 invested in the stock.

Now suppose that another man invests only \$2,500 in stock, that he carries as good a stock as the man who has invested \$10,000 and that by turning over his stock four times in a year he is able to equal in annual sales that of the other man. His sales and his margin being the same, he will have a gross of \$5,384.61 with which to meet all expenses and provide a profit. Since, however, he has invested but \$2,500 in stock the interest on this capital amounts to only \$150, leaving a balance on the margin of \$5,234.61, or \$450 more than the man who turned his stock but once.

Selling Off Stock —

Setting a time limit on all stock carried also helps, just as the readiness-to-serve rate of the central station helps to increase the load factor. It does not pay to carry seasonable goods over from one season to another. It pays better to turn them into money even though they have to be sold at cost or less and use this money to buy stock that will sell. The most successful business men do follow this practice. The shoe business is an example of this. Many styles of shoes carried by the average shoe dealer are seasonable in nature. The prosperous dealer is the one who closes out his stock of seasonable shoes at the end of each season. The desire to do this on the part of shoe dealers has given rise to many different methods of getting rid of them. From the dealer's point of view the important thing is that the shoes are disposed of.

A Question of Variety —

Other things being equal, the electrical dealer who will make the most money is the one who moves his stock most rapidly, who makes the largest possible number of turnovers. Usually such a dealer is the one who carries a good variety, a good assortment of stock rather than a large stock in any one line. With the present unsettled condition of prices it is more than ever important that every dealer give this phase of the business the most careful attention.

SPARKS—Current Facts, Figures and Fancy

(Vacuum cleaners for street cleaning, wireless telephones for forest protection and metal checks for car fares are among the recent ingenuities of the busy human animal. Steam railways and Mexican financiers, however, are still giving trouble, and the tractor seems to have outwitted the statisticians in a mysterious manner.—The Editor)

The recent destruction of two thousand acres of wheat by a fire started by sparks from an engine suggests food conservation as another argument for the electrification of railroads.

* * *

There are more automobiles on the streets of Calcutta than any other kind of vehicle. All the automobiles imported into the city since the signing of the armistice and the removal of the import embargo have been of American manufacture.

* * *

At the end of 1917 there were 152,000 persons in Japan on the waiting list for telephone installation. The demand is so great that when one subscriber is ready to give up his telephone he sells it through a broker, at a regular market value.

* * *

To the office clerk who indulges in twenty cents worth of coffee and doughnuts for lunch the feat of a pair of rats who ate a restaurant meal costing \$359 is something to be remembered. The meal consisted of greenbacks which the manager of a restaurant had tucked behind the ice-chest.

* * *

In the No Accident week, recently conducted by the United States Railroad Administration, forty-eight out of sixty roads in the Central Western Region—the winning district—showed a clear record, and the others reduced accidents seventy-nine per cent over the same week in 1918.

* * *

The vacuum cleaner, having established its reputation with regard to carpets, is now extending its activities to streets. In Los Angeles it has almost entirely replaced water-flushing in the cleaning of paved streets, and four machines, working two shifts of eight hours each, clean approximately 1,500,000 square yards of pavement a day.

* * *

In spite of the decreasing use of horses and the prophecy that less land would be used for growing horse feed, figures for last year show an increase of 44 per cent over those of 1916 in the acreage planted with oats. The only explanation seems to be that farmers with tractors are keeping their horses as pets or feeding the tractors on oats.

* * *

Wireless telephones are being tried out by the federal government in connection with protection of the national forests from fire. Wire communication has been made ineffective in many cases by falling timber, heavy storms, and snow slides. Four combi-

nation sets of transmitting and receiving apparatus have been lent to the Forest Service by the Signal Corps.

* * *

The mysteries of distribution are not simplified for most of us by a recent statement that it costs more to get a barrel of potatoes from the corner grocery to a city home than it does to bring it five hundred miles from where it was grown to the corner grocery store, and that it costs more to put a barrel into a steamship in New York than it does to transport it all the way to Liverpool.

* * *

An Aeronautical Exposition will be held at Amsterdam, the Netherlands, during August and September this year. At the exposition, which is the first of its kind, there will be displayed in addition to the various designs of aircraft and aircraft parts, the innumerable accessories to air travel—flying suits, heating devices, instruments for wireless telegraphy, maps, literature and so forth.

* * *

A water-proof glue with which small beams of wood can be built up into large beams has been invented by the Forestry Department. These built-up beams are stronger than solid beams, and it is said the discovery may have great influence on the timber problem by permitting the harvesting of partly grown trees. It also suggests a dignified future for matches as building material when electricity comes into its own.

* * *

Letting the corn starch burn while you open the door to the butcher is made unnecessary by an ingenious door recently patented in Great Britain. It is double, and designed with compartments into which tradesmen may put packages without disturbing the inhabitants of the house. When the outer door is closed it automatically unlocks the inner door enabling the packages to be removed from the inside. It is mechanically impossible for both inner and outer door to open at the same time.

* * *

Almost everybody has been making money in Mexico. "Make" here is not synonymous with "earn": we refer to the engaging plan devised by Villa, who provided himself with a small hand press and a tramp printer and struck off a few thousand pesos whenever he wanted a new suit. Unfortunately the printer took to loaning the apparatus to his friends, with the result that some \$2,000,000,000 worth of engraved certificates have been issued in Mexico of recent years, some of them on wrapping paper.

PERSONALS

C. L. Chamblin, Manager of the California Electrical Construction Company, who was recently elected President

of the State Association of Electrical Contractors and Dealers at the successful and well attended Santa Cruz Convention, is already very well known to the men of the electrical industry as the able chairman of the Electrical Contractor-Dealers' Association of San Francisco. His executive ability as presiding officer and his efficient and enthusiastic work in connection with the organization amply justify the distinction

conferred upon him, and warrant the prophecy that the State Association faces an especially active and successful year under his capable leadership.

Geo. W. Boschke, mechanical engineer of Portland, Ore., is among recent visitors from the Northwest to San Francisco.

H. A. Olds has opened an office in the Rialto Bldg., San Francisco, for the Smith-Booth-Usher Co., of Los Angeles, representatives of manufacturers of contractors' equipment.

F. M. Hamilton, superintendent of the department of accident investigation of the Puget Sound Traction Light & Power Company, Seattle, is making a business trip to Philadelphia.

S. S. Jackson, formerly proprietor of the Berkeley Electric Construction Co., and recently returned from overseas service with the A. E. F., is now with the Levy Electric Co., of San Francisco.

R. H. Gregory, Comptroller of the Western Electric Company with headquarters in New York, has arrived in Los Angeles for a brief stay to study business conditions in Southern California.

A. I. Whitehead has been transferred from District Agent of the Southern California Edison Company, Vernon, to District Agent of the Mt. Whitney Power & Electric Company, Porterville.

Hal Lauritzen, Western Representative of the Duplex Light Works of the General Electric Company with headquarters in New York, arrived in Los Angeles last week and intends to tour the Pacific Coast before returning East.

D. W. A. Peaslee, formerly professor of electrical engineering in the Oregon Agricultural College and recently in France as a Captain of Engineers, has just been appointed chief engineer of the Jeffery-DeWitt Insulator Company.

Frank S. Easton, formerly with the British Columbia Electric Railway at Vancouver, has entered the employ of the Mexican Light & Power Company, of Mexico City, and expects to be engaged in the company's work in South America for some time.

E. J. McIlraith, formerly superintendent of ways and structures with the Puget Sound Traction Light & Power Company at Seattle, has been appointed to the position of engineer in charge of maintenance with the Philadelphia Rapid Transit Company.

L. A. Wallon has recently returned from Chicago where he was drafted by Stone & Webster on the indexing system for the appraisal of the Chicago surface lines, and is again

on his job as assistant engineer of the Puget Sound Traction Light & Power Company at Seattle.

Tracy A. Johnson, vice president of the corporation that directs the Colorado Springs Light, Heat & Power Company, is in Colorado Springs for an indefinite period to cooperate with R. L. Holland, resident vice president of the company, in the matter of refinancing the local company.

F. E. Pernot, Assistant Professor of Electrical Engineering at the University of California, is the author of an eight-page engineering publication just issued by the University of California Press, describing the extension of the step-by-step method of transmission line computation.

J. H. Jamison, of the Westinghouse Electric & Manufacturing Company, Los Angeles, has left for an extended trip throughout the East accompanying Mr. C. B. Hall, Secretary and Treasurer of the Illinois Electric Company. They intend to visit Chicago, New York, and Pittsburgh as well as many other large eastern cities.

Elliot Reid, formerly Assistant to the General Manager of the Westinghouse Lamp Company, of New York, has been appointed Sales Manager of the Westinghouse Lamp Company, and in that capacity will be responsible for the commercial activities of the Company in both large and miniature classes of lamps in domestic territory.

C. B. Hall, Secretary and Treasurer of the Illinois Electric Company has left Los Angeles for the East to visit the Eastern branch of his company. He is also planning to visit the East Pittsburgh Works of the Westinghouse Electric & Manufacturing Company and other large electrical manufacturers which he represents on the Pacific Coast.

I. W. Alexander, of the San Joaquin Light & Power Corporation, and chairman of the Publicity Committee of the Pacific Coast Section N. E. L. A., has recently been laid up in a Sanitorium near Fresno, recuperating from an operation for appendicitis. Mr. Alexander is fast getting back into trim and will be back at his work again in a few days.

Chas. Listenwaller and P. G. Gough, of Listenwaller & Gough, Electrical Jobbers, in Los Angeles, have recently returned from the East where they have been appointed exclusive distributors for the new Blue Bird Appliances in Southern California and Arizona. The Listenwaller & Gough Company have recently joined the Electrical Supply Jobbers on the Pacific Coast.

Samuel Russell, Jr., District Manager of the Crocker-Wheeler Company's district office at Philadelphia, has been a visitor in San Francisco for the past week. Mr. Russell is a pioneer in the electrical business, having entered it in 1888 soon after his graduation from Brooklyn Polytechnic Institute. Mr. Russell visited Seattle and Portland, and while in San Francisco has been looking after his company's interests in connection with the San Francisco district office.

Harry G. Holabird, long known as the Los Angeles representative of the Holabird Electrical Co., announces that

in future he will devote all his time and energies to the business of the Ohio Brass Company, who manufacture high tension insulators and overhead trolley material; and also to the Central Tube Company of Pittsburgh, who manufacture rigid iron conduit. Harry Holabird is one of those pleasing personalities one likes to see at conventions and in fact in all gatherings where men of the industry meet, and as a consequence all well-wishers of the industry wish him every success in his new field of endeavor.



E. C. Jones, chief engineer of the gas department of the Pacific Gas & Electric Company, San Francisco, has been nominated vice-president of the American Society of Mechanical Engineers. Only in one other instance of its years of eventful history has this distinguished society granted such a recognition to its engineering membership west of the Rocky mountains. The recognition in the case of Mr. Jones comes due to two prime reasons—first as an engineer he has brought credit and distinction to the profession, especially in his



genius displayed in oil gas manufacture and second, the unusual interest and activity in affairs of the society wherein he has as chairman of the San Francisco Section brought Western engineers and Western ideals into prominence throughout the nation. All well-wishers of the West offer to Mr. Jones their heartiest and sincerest congratulations.

A. A. Smith, with the Graham Reynolds Electric Company, of Los Angeles, has returned from the east where he has been studying business conditions for his firm.

E. C. Hodges, formerly with the Pacific States Electric Company, in San Francisco, has joined the sales forces of the Western Gas & Electric Appliance Company of Chico, Cal.

H. Alex. Hibbard, General Sales Agent for the T. & W. Universal Plug Company of Santa Ana, California, has returned to Denver after an extended trip through all the large centers of the East.

A. B. Wallaber, former District Agent of the Southern California Edison Company, at San Bernardino, has been appointed District Agent at Pasadena. He is succeeded at San Bernardino by F. A. Williamson.

Tracy W. Simpson, Pacific Coast Manager Federal Sign System (Electric) is in the East attending a conference of his company's officials at Chicago. He will not return to his San Francisco office until about the middle of August.

H. C. Rice, formerly a power salesman with the Southern California Edison Company, and recently discharged from the army, has been appointed Chief Appliance Salesman to succeed H. B. Fletcher, who goes to Van Nuys as district agent.

Frank N. Cooley has been appointed sales manager at Seattle for the Western Electric Company. Mr. Cooley has been in the Northwest for some time, having represented the Company in Seattle as supply specialist and assistant sales manager.

C. E. Houston, for the past six years district foreman of the Southern California Edison Company, Oxnard, California, has recently been appointed District Agent to succeed Mr. Al McKenzie, former District Agent, who has entered the automobile business.

Chas. B. Wing, professor of structural engineering at Stanford University, has returned to his home at Palo Alto, California, from "Over There," where as Lieutenant Colonel of Engineers he has in recent months had a most active part among our expeditionary forces in France.

K. E. Van Kuran, District Manager, and C. D. LaMoree, Manager of the Supply Division of the Westinghouse Electric & Manufacturing Company, have recently returned from the El Paso office of their company where they witnessed the recent fight between the American and Villa troops.

F. E. Wynne, general engineer of the Westinghouse Electric & Manufacturing Company, was one of a committee of thirteen eminent engineers who recently visited points in Montana for the purpose of inspecting the electrical plants

of the Montana Power Company and observing the operation of the electrified lines.

J. F. Kinder has been appointed by the Ajax Electric Specialty Company of St. Louis as their sales representative at Portland, Ore., for the northern coast district. In our July 1st issue, in which this announcement originally appeared, the word "Ajax" was erroneously printed to read "Apex."

Otto B. Goldman, of the Oregon State Agricultural College has been promoted to the rank of professor of mechanical engineering in that institution. Professor Goldman is familiar to readers of the Journal of Electricity as an occasional contributor on heating and ventilating discussions.

W. S. Norviel, an attorney at law of Phoenix, Arizona, has been appointed Water Commissioner of Arizona, where a water code similar to California, Oregon, and other western states has recently gone into effect. Mr. Norviel is a recent San Francisco visitor where he has been in conference with Messrs. Chandler and Johnston of the California Water Commission.

G. J. Schmidt has recently returned East after a brief visit to the Coast, stopping at Seattle, San Francisco and Los Angeles. Mr. Schmidt is connected with the engineering staff of the Westinghouse Electric & Manufacturing Company, and has much to do with the rapid development of the polyphase motor.

Dr. Gitaro Yamakawa, who has for some time been head of the Science and Engineering Department at the Imperial University in Tokyo, is a recent San Francisco visitor. As former president of the illuminating engineering society of Japan, Dr. Yamakawa has had a most active part in electrical matters in his country. His visit in this country will prove unusually welcome.

Gerard Swope, president of the International General Electric Company, has recently arrived in San Francisco en route from the Orient to his New York office. While in San Francisco Mr. Swope was a guest of Dr. Thomas Addison, Pacific Coast manager of the General Electric Company. Mr. Swope is brim full of enthusiasm over the business outlook in the Orient. In an interview with a representative of the Journal of Electricity he stated that business conditions in Japan are very active, while in the great China Republic the future is unquestionably one of great opportunity. Before leaving Tokyo on July 3, a notable gathering of engineering talent welcomed his presence in Japan and at the dinner following, at which he was a guest of honor, the engineering and commercial interests present were unusually cordial in their expression of kindly feeling for him and for the new international organization over which he is chief executive.

Fred D. Weber, Chief Electrical Engineer of the Oregon Insurance Rating Bureau has been elected vice president of

the newly created state board of engineering examiners in Oregon. The board calls for a membership of nine—two mechanical engineers, two hydraulic engineers, two civil engineers, two mining engineers and one electrical engineer. This representative appointment comes to Mr. Weber in recognition of his active and effective work in connection with the plan. The question of the licensing of engineers is one which is



being widely discussed in all sections of the country, and the Oregon board is one of the first groups to be created for this purpose. Mr. Weber, in addition to his other activities, is representative of the Journal of Electricity in the Northwest.

Meeting Notices for Electrical Men

(Summer vacations are the principal activity of electrical and engineering organizations just at present. Some few, however, still report meetings in spite of the wholesale exodus of members. Chief among these are the Contractor-Dealer Association of Oregon and the Engineers' Club of San Francisco, both of which have been assembling regularly.—The Editor.)

Oregon Association of Electrical Contractors and Dealers

The regular meeting of the Oregon Association of Electrical Contractors and Dealers for District No. 1 met at the Imperial Hotel at 6:30 p.m. June 30. The following firms were represented:

F. A. Bauman & Co.
Beaver Electric Co.
Coast Steel & Machinery Co.
J. C. English Co.
Jaggar-Sroufe Co.
R. C. Kingery

E. L. Knight & Co.
NePage McKenny Co.
Pierce Tomlinson Electric Co.
Scott Electric Co.
Vanderlip & Lord
Western Electric Works

The Executive Committee made an oral report recommending a reduction in dues on the following basis for members of District No. 1, to-wit: Class A members, \$15.00 a

quarter; Class B members, \$18.00 a quarter; Class C members, \$21.00 a quarter; Class D members and over, \$27.00 a quarter; said dues to become effective July 1, 1919, and that all money so paid in would be the property of and belong to the State Association. It was recommended that the money now on hand in the local Association be kept separate and apart and for the use of the local Association; also that all money collected for dues up to July 1st for local dues to be added to this fund. It was also recommended that for the time at least the Association reduce expenses by doing without a paid secretary and that Mr. Tomlinson act as temporary secretary without compensation; that the offices now located in the McKay Building be retained, and that the business for the time being and until other arrangements be made would be taken care of by the temporary secretary, with the assistance of the members of the Executive Committee. These recommendations of the Executive Committee were adopted.

The matter of Mr. Scott's resignation from the Price List Committee was taken up and Mr. Scott was asked to retain the chairmanship and to act in conjunction with the Merchandising Section in the preparation of future price lists to be printed.

The meeting of July 14 was called to order at 8 p.m. by Chairman Kenney.

Under reports of officers, discussion of back dues was commented upon, and all present admonished to pay up, the same request to be communicated to those absent.

A communication was received from the Builders' Exchange inviting the attendance of the Association at the annual picnic at Crystal Lake Park. It was voted that a personal invitation be issued by the office, urging the individual members to participate in this event. It was further agreed that at least one delegate be designated to represent

the Association. The Chair appointed Mr. Green as that representative.

The Executive Committee made mention of certain expenditures necessary for outfitting the office, and authority was given to them to make such expenditures as were necessary in this connection. A request was made that the Legislative Committee be instructed to assist the Electrical Division in the formation of a revised Code.

The publication of a sheet devoted to estimating was discussed and the opinion of the parties who had examined it was that for contractors, who are the ones doing estimating, the sheet contained no information that could not be better secured through the regular trade journals.

Then followed a discussion concerning the Retail Section. It appeared that a number of the members had not been notified of the formation of this section, and it was deemed advisable therefore that this matter be referred back to the Executive Committee who would carefully go into the details concerning the necessity of this section, and who would define the scope of its activities.

Jovian Electric League

The Jovian Electric League of Los Angeles have discontinued their meetings for the summer months. The first meeting of the coming year will be held the first Wednesday in September at which time Colonel Charles Decker, an engineer recently returned from France, will be the principal speaker.

Association of Electrical Contractors and Dealers

The National Association of Electrical Contractors and Dealers held a four days' con-

vention in Milwaukee, Wis., recently. The registered attendance was approximately 350. The national executive committee meetings were held on the two days preceding the convention, the principal subject of discussion being the bureau of education and research which the association will organize in cooperation with the manufacturers, jobbers and central stations of the country. The plan was heartily endorsed and the discussion related mainly to methods of financing it. The outcome was that the manufacturers would supply funds for national work to be directed by the Contractor-Dealer Association, and funds for carrying out work in local territories was to be raised in each case by subscription from all interested locally.

The convention proper was opened by addresses of welcome delivered by Paul C. Burrill, chairman of the Wisconsin State Association, and Cornelius Corcoran, acting mayor of Milwaukee. W. Creighton Peet, president of the national association, stated in his response that the membership of the

BUILDERS OF THE WEST—LVIII



C. R. WEYMOUTH

Fuel oil in its power generating characteristics is proving in these stirring days of readjustment to be a matter of prime importance on land and sea. Far beyond the borders of our great West the fame of western engineers has traveled in the matter of economic utilization of this wonderful natural resource in the generation of steam electric power. To C. R. Weymouth, Chief Engineer of Chas. C. Moore & Company, Inc., engineers of San Francisco, this issue of the Journal of Electricity is affectionately dedicated in appreciation of his establishment of economy records of fuel oil utilization hitherto unattained in the achievement of steam engineering practice.

association had increased 35 per cent during the year in spite of unfavorable conditions. Mr. Peet recommended consistent reading of the trade journals as a means of making the most of opportunities. Among the topics treated in papers read at the various sessions were "Keeping Up with Rising Costs," "Cooperation in Business" and "Estimating Forms and Methods."

National Electric Light Association

President R. H. Ballard has sent out to member companies of the National Electric Light Association a questionnaire, as follows:

- (1) Have you any suggestions to make which might aid in carrying out our desire to be of service?
- (2) Have you any problems concerning which you would like information which might help in their solution?
- (3) What suggestions can you offer resulting from your experience which might benefit other companies in the conduct of their affairs?

The object of this is to encourage the interchange of thought and cooperation along constructive lines which is so necessary in the Association's work, particularly at this period. It is President Ballard's wish to make the Association a clearing house for information regarding the problems of the members.

American Association of Electrical Engineers

The following are among the western members elected to Associate membership in the American Association of Electrical Engineers, June 25, 1919:

Ernest E. Aldous, Asst. Manager, Denver Office, American Steel & Wire Co., Denver, Colo.; Harry Archer, Erecting Engineer, General Electric Co., Seattle, Wash.; John Earl Atkinson, Machinery Application Engineer, Westinghouse Electric & Manufacturing Co., Seattle, Wash.; Charles D. Bronson, Load Dispatcher, Pacific Gas & Electric Co., Oakland, Cal.; Nicholas Everett Brown, Gen. Supt., U. S. Electrical Mfg. Co., Los Angeles, Cal.; William M. Brown, Inspector, Colorado Fuel & Iron Co., Pueblo, Colo.; James Springer Burton, Substation Operator, Puget Sound Traction, Light & Power Co., Seattle, Wash.; Leslie M. Butcher, Examiner, Educational Department, Mountain States Tel. & Tel. Co., Denver, Colo.; James C. Caine, Deputy City Electrical Inspector, City Hall, North Portland, Ore.; Aaron B. Cayo, Chief Tester, Portland Railway, Light & Power Co., Portland, Ore.; John Nelson Chamberlin, Plant Engineer, Pacific Tel. & Tel. Co., San Francisco, Cal.; William J. Cottrell, Engineer-Salesman, H. W. Johns-Manville Co., Portland, Ore.; Calvin Orrin Crane, Electrical Engineer, Idaho Power Co., Boise, Ida.; Edwin J. Des Camp, Sales Engineer, Western Electric Co., Seattle, Wash.; Harold Farley Elliott, Production Manager, Federal Telegraph Co., Palo Alto, Cal.; Alan Wymar Eshelby, Railway Engineer, Westinghouse Electric & Mfg. Co., Seattle, Wash.; James W. Ferguson, Division Foreman, Seattle Municipal Light Plant, Seattle, Wash.; Andrew Forbes, Electrician, Portland Railway, Light & Power Co., Portland, Ore.; Andrew Clayton Freese, Chief Inspector, Colorado Fuel & Iron Co., Pueblo, Colo.; Stephen E. Gamble, Sales Engineer, Westinghouse Electric & Mfg. Co., San Francisco, Cal.; Lew Wallace Going, Acting Chief Electrical Inspector, Electrical Division, City Hall, Portland, Ore.; Adolphe Griffith, Inspector of Electrical Equipment, Colorado Fuel & Iron Co., Pueblo, Colo.; Clyde C. Hayden, Foreman of Sub-

stations, Southern Pacific R. R. Co., Oswego, Ore.; William F. Hedin, Load Dispatcher, Portland Railway, Light & Power Co., Portland, Ore.; L. E. Hinman, Asst. Engineer, Southern Pacific R. R. Co., Portland, Ore.; George L. Hoard, Private, M. G. Co., 28th Infantry, U. S. Army, Seattle, Wash.; Carl H. Hoge, Distribution Engineer, Puget Sound Traction, Light & Power Co., Seattle, Wash.; Perry L. Jewett, Head Electrician, Sunset Field Division, Southern Pacific Co., Fuel Oil Dept., Kerto, Kern Co., Cal.; Henry R. Jones, Gang Foreman, Construction Elec. Dept., Colorado Fuel & Iron Co., Pueblo, Cal.; Raymond Leslie Jones, Engineer of Equipment Costs, The Pacific Tel. & Tel. Co., Oakland, Cal.; William L. Kimmel, Member of Firm, Nixon-Kimmel Co., Spokane, Wash.; A. H. Krul, Electrical Engineer, Portland Railway, Light & Power Co., Portland, Ore.; Patrick Fred McBan, Illuminating Engineer, Washington Motion Picture Corp., Spokane, Wash.; Chester Arthur Montgomery, Salesman, Westinghouse Electric & Mfg. Co., San Francisco, Cal.; Paul B. Munson, Mechanical Application Engineer, Westinghouse Electric & Mfg. Co., Seattle, Wash.; Arthur Percival Newberry, Chief Operator, White River Generating Station, Puget Sound Traction, Light & Power Co., Dieringer, Wash.; Robert D. O'Neil, Supt. of Inside & Underground Construction, Tacoma Light Dept., Tacoma, Wash.; Conrad P. Opitz, Station and Dist. Operator, Puget Sound Traction, Light & Power Co., Renton, Wash.; Frank Arthur Parmelee, Electrician, Colorado Fuel & Iron Co., Minnequa Works, Pueblo, Colo.; George T. Pfeiffer, Asst. Manager, U. S. Electrical Mfg. Co., Los Angeles, Cal.; Harold A. Rands, Member of Firm, Rands & White, Portland, Ore.; Vincent J. Richards, Foreman, Electrician, Columbia River Shipbuilding Corp., Portland, Ore.; Foy O. Rogers, Patrol & Service Maintenance Foreman, Hydro-Electric Power Plant, Dieringer, Wash.; L. S. Ruble, Salesman, North Coast Electric Co., Portland, Ore.; Gilbert L. Scoville, Engineering Dept., Pacific Tel. & Tel. Co., San Francisco, Cal.; Gordon Russell Shuck, Instructor of Electrical Engineering, Univ. of Washington, Seattle, Wash.; Ernest A. Smith, Electrical Foreman, Inspiration Cons. Copper Co., Miami, Ariz.; Leo D. Snow, Foreman of Testing Laboratory, Puget Sound Traction, Light & Power Co., Seattle, Wash.; Thomas James Spencer, Puget Sound Traction, Light & Power Co., Dieringer, Wash.; Albrecht Strieff, Operator, Northwest Electric Co., Hillsdale, Ore.; Robert J. Stull, Testing & Regulating Attendant, Western Union Tel. Co., San Francisco, Cal.; Hugo B. Sturges, Department Electrical Inspector, City of Portland, Portland, Cal.; W. I. Teague, Division Supt. of Plant, The Pacific Tel. & Tel. Co., San Francisco, Cal.; A. A. Tobey, Electrical Contractor, Portland, Ore.; W. D. Turner, Electrician, Colorado Fuel & Iron Co., Pueblo, Colo.; J. Wallace, Central Office Engineer, Pacific Tel. & Tel. Co., San Francisco, Cal.; Walter J. Walsh, Operator, Butte Electric Railway Co., Butte, Mont.; William Henry Warren, Transmission Inspector, Pacific Tel. & Tel. Co., San Francisco, Cal.; John Ford Warris, Lieut. (j.g.), U. S. N., Executive Officer and Electrical Officer, U. S. S. S-33, Union Iron Works, San Francisco, Cal.; Jay Maxwell Wauchope, Chief Electrician, International Smelting Co., Tooele, Utah; Wilfred A. White, Engineer, North Coast Power Co., Portland, Ore.; Norton Parker Wilson, District Service Manager, Westinghouse Electric & Mfg. Co., Seattle, Wash.; Noble A. Wright, Electrical Engineer, The Schaw Batcher Co. Pipe Works, San Francisco, Cal.

Engineers' Club of San Francisco

On July 12th the Engineers' Club of San Francisco enjoyed an interesting talk from Lieutenant-Colonel Chas. B. Wing of Stanford University. Lieutenant-Colonel Wing has just returned from France and this meeting was the occasion for a large gathering of his many friends and associates.

San Francisco Electrical Development League

The San Francisco Electrical Development League has temporarily suspended meetings. The fact that so many members are taking vacations at this time of year makes it convenient for the club itself to take a brief vacation.

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers

President—Calvert Townley, Westinghouse Electric & Manufacturing Company.
Secretary—F. L. Hutchinson, Engineering Society Bldg., New York City.
Meetings—Monthly.

Los Angeles Section

Chairman—J. H. Cunningham, General Electric Co., Los Angeles.
Secretary—Clem A. Copeland, Bureau of Power and Light, Los Angeles.
Meetings—Second Tuesday of each month.

Portland Section

Chairman—W. D. Scott, Pacific Telephone & Telegraph Company, Portland, Ore.
Secretary—E. H. LeTourneau, Portland Railway, Light & Power Company, Portland, Ore.
Meetings—Monthly.

Denver Section

Chairman—Prof. H. S. Evans, Univ. of Colorado, Boulder.
Secretary—Robt. B. Bonney, Mountain States Tel. & Tel. Co., Denver, Colo.

Meetings—Third Saturday of each month, at the Shirley Hotel.

San Francisco Section

Chairman—W. G. Vincent, 445 Sutter St., San Francisco.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings—Fourth Friday each month—Engineers' Club, 7 p.m.

Seattle Section

Chairman—John Harisberger, 4015—4th Ave. N. E., Seattle, Wash.
Secretary—T. C. Smith, City Lighting Department, Seattle, Wash.
Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.

Spokane Section

Chairman—George Nixon, Main and Lincoln Sts., Spokane.
Secretary—G. H. Hoppin, 1128 W. Kiernan Ave., Spokane.
Meetings—Third Friday of each month.

Utah Section

Chairman—A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
Secretary—H. T. Plumb, 183 U St., Salt Lake City, Utah.
Meetings—Third Wednesday of alternate months, 8 o'clock. Assembly Room of Commercial Club, Salt Lake City.

Vancouver Section

Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch

Chairman—A. E. McMahon, University of California, Berkeley, Cal.
Secretary—D. D. Davis, University of California, Berkeley, Cal.

University of Colorado Branch

Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

Idaho University Branch

Meetings—First Wednesday evening of each month from October to June.

University of Washington Branch

Chairman—Jack Tolmie, Univ. of Washington, Seattle.

Secretary—Glen Walker, Univ. of Washington. Meetings—Monthly, first Tuesday, Forestry Bldg.

Oregon Agricultural College Branch

Chairman—Lawrence Fudge, Oregon Agr. College, Corvallis, Ore.

Secretary—Otto L. Cantrall, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch**Montana State College Branch**

Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.

Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Throop College of Technology Branch

Chairman—Mark Sawyer, Throop Dormitory, Pasadena, Cal.

Secretary—Russell Otis, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch

Chairman—Clarence E. Guse, Pullman.

Secretary—Ralph C. Guse, State College of Washington, Pullman.

Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS**National Association of Electrical Contractors and Dealers**

Chairman—W. Creighton Peet.

Secretary—W. H. Morton, 110 West 40th St., New York.

Executive Committeemen, Pacific Division—J. R. Tomlinson, Portland, J. F. NePage, Seattle, Wash.

Electrical Contractors & Dealers of Salt Lake City

President—G. W. Forsberg.

Secretary—E. H. Eardley, Eardley Bros., Salt Lake City.

British Columbia Ass'n Electrical Contractors and Dealers

President—E. Brettell, Vancouver, B. C.

Secretary—Capt. W. J. Conway, Vancouver, B. C.

Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers

President—M. A. De Lew, 180 Jessie St., San Francisco.

Secretary—J. W. Redpath, Rialto Bldg., San Francisco.

Meetings—Monthly.

Denver Electrical Contractors' Association

President—E. C. Headrick.

Secretary—C. N. Shannon, 227 Coronado Bldg.

Meetings—2nd and 4th Monday nights of each month.

Electrical Contractors and Dealers Ass'n of San Francisco

President—C. L. Chamblin, 641 Mission St., San Francisco.

Secretary—Louis R. Ardoun, San Francisco.

Meetings—Friday, 12:30; New Call Bldg.

Southern California Electrical Contractors and Dealers

President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.

Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.

Meetings—Every Friday at 5:30 p.m. at the Pin Ton Cafe, 427 South Broadway.

Monterey Bay Electrical Contractors and Dealers

President—W. Cox, Santa Cruz.

Secretary—D. K. Noggle, Monterey.

Nevada Ass'n of Electrical Contractors and Dealers

President—F. V. McAvoy, 138 N. Canfer St., Reno.

Secretary—R. W. Shearer, 215 Sierra St., Reno.

Meetings—Twice a month, 15th and 30th.

Oregon State Ass'n of Electrical Contractors and Dealers

President—R. C. Kenney, 388 Burnside street, Portland.

Secretary—J. Willis Oberender, 209-10 McKay Bldg., Portland, Ore.

Portland Local Ass'n of Electrical Contractors and Dealers

President—Roy C. Kenney, Portland.

Secretary—J. W. Oberender, 209-10 McKay Bldg., Portland.

Meetings—Alternate Mondays at Imperial Hotel Grill.

Sacramento Section, California Electrical Contractors & Dealers' Association

President—W. H. Gribble, Sacramento.

Secretary—H. Berg, Sacramento.

Washington Ass'n of Electrical Contractors and Dealers

President—V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.

Secretary—Forrest E. Smith, Seattle, Wash.

Meetings—Quarterly—second Thursdays of March, June, September and December.

JOBBER'S ASSOCIATIONS**Electrical Supply Jobbers Association**

General Secretary—Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.

Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers

President—T. E. Bibbins, 575 Mission St., San Francisco.

Secretary—Albert H. Elliot, 544 Market St., San Francisco.

Meetings—Quarterly.

Electrical Credit Ass'n of the Pacific Coast

President—C. L. Gilson, Gilson Electrical Supply Co., 304-12th St., Oakland, Cal.

Secretary—Albert H. Elliot, 544 Market St., San Francisco.

Meetings—annually; San Francisco; May.

OF ELECTRICAL INTEREST**California Electrical Cooperative Campaign**

Chairman Advisory Committee—L. H. Newbert, 445 Sutter St., San Francisco.

Secretary—Captain Howard Angus, New Call Bldg., San Francisco.

Colorado Electric Light, Power and Railway Association

President—E. A. Phinney, Jefferson Co. Power & Light Co.

Secretary-Treasurer—F. P. Safford, Denver Gas & Electric Co., Denver, Colo.

National Electric Light Association

President—R. H. Ballard, Southern California Edison Company.

Secretary—T. Comerford Martin, 29 West 39th St., New York.

Nebraska Section, N. E. L. A.

President—T. H. Fritts, Central Power Company, Grand Island, Neb.

Secretary-Treasurer—B. H. Conlee, Beatrice Gas & Electric Company, Beatrice, Neb.

Nevada Section, N. E. L. A.

Chairman—Geo. A. Campbell, Reno, Nev.

Pacific Coast Section, N. E. L. A.

President—A. E. Wishon, San Joaquin Light & Power Corporation, Fresno, Cal.

Secretary—A. H. Halloran, Journal of Electricity, Electric Bldg., San Francisco.

Meetings—Annually, in April.

Portland Section, N. E. L. A.

Chairman—F. H. Murphy, Portland Railway, Light & Power Company.

Secretary—Geo. Bowen, Portland, Ore.

Illuminating Engineering Society

President—S. E. Doane.

Secretary—Clarence L. Law.

Western Representatives—Romaine Myers, Bacon Bldg., Oakland, Cal.; C. M. Masson, Edison Bldg., Los Angeles; F. H. Murphy, Portland Railway Light & Power Company, Portland, Ore.; W. R. Putnam, Utah Power & Light Company, Salt Lake City; Fred A. Osborn, University of Washington, Seattle, Wash.

Meetings—First Tuesday each month.

New Mexico Electrical Association

President—D. W. Morgan, Las Cruces, N. M.

Secretary—Charles Twogood, Albuquerque, N. M.

Meetings—Annually, in February.

Southwestern Electrical and Gas Association

President—W. A. Sullivan, Shreveport, La.

Secretary—H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Northwest Electric Light and Power Ass'n

President—H. J. Gille, Puget Sound Traction Light & Power Co.

Secretary—W. E. Herring, Puget Sound Traction, Light & Power Co.

Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.

Los Angeles Jovian Electrical League

President—A. E. Peat, San Joaquin Light & Power Corp.

Secretary—Frank Weiss, Los Angeles Gas & Electric Corp.

Meetings—Every Wednesday, 12 m.

San Francisco Electrical Development League

President—Henry Bostwick, 445 Sutter St., San Francisco.

Secretary—J. W. Redpath, Rialto Bldg., San Francisco.

Meetings—Every Monday, 12:10 p.m.; luncheon, Palace Hotel.

Electric Metermen's Association

President—J. E. Bridges, Westinghouse Electric & Manufacturing Company.

Secretary—A. E. Coney, Great Western Power Company, San Francisco.

Meetings—About every 60 days.

Alameda County Electrical Club

President—George Drew, Pacific States Electric Company, Oakland, Cal.

Secretary—George B. Furniss, Pacific Gas & Electric Company, Oakland, Cal.

Synchronous Club

Secretary—H. N. Beecher, City Hall, Los Angeles.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section

President—W. H. Brommage, Pacific Tel. & Tel. Co., San Francisco.

Secretary—Chas. H. Dobson, 835 Howard St., San Francisco.

MECHANICAL ENGINEERS**National Officers**

President—Mortimer E. Cooley, Electrical Engineering Dept., Ann Arbor, Mich.

Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

San Francisco Section, A. S. M. E.

President—W. F. Durand, Stanford University, Palo Alto, Cal.

Secretary—Jas. A. Kinkead, Rialto Bldg., San Francisco.

Meetings—Quarterly.

Thursday lunches have been arranged at the Engineers' Club, 57 Post St.

Los Angeles Section, A. S. M. E.

President—Charles H. McGuire.

Secretary—T. J. Royer.

Meetings—Quarterly.

ENGINEERS' CLUBS**Oregon Society of Engineers**

President—John W. Cunningham, 414 Spalding Bldg., Portland.

Secretary—Orrin E. Stanley, Box 973, Portland.

Meetings—Annual: First Monday in February.

Monthly: Third Thursday of each month.

Third Thursday of each month.

The Engineers' Club of Seattle

President—H. E. Horrocks, Seattle, Wash.

Secretary—E. J. Bartells, Northern Life Bldg., Seattle, Wash.

Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco

President—A. E. Chandler, New Call Bldg., San Francisco.

Secretary—J. R. Brownell, Manufacturers' Indemnity Exchange, San Francisco.

Annual Meeting: October.

Idaho Society of Engineers

President—W. H. Gibson, Mountain Home, Idaho.

Secretary—Ira F. Shaffner, Boise, Idaho.

Engineers' Club of Oakland

President—R. S. Chew, Oakland Chamber of Commerce, Oakland.

Engineers' Club of Sacramento

President—George S. Nickerson, 914 Forum Bldg., Sacramento.

Secretary—P. M. Noebue, State Department of Engineering, Forum Bldg., Sacramento.

Colorado Engineering Council

President—Arthur Ridgway, 810 Equitable Bldg., Denver.

Secretary-Treasurer—Robert J. Grant, 614 Interstate Trust Bldg., Denver.

United Engineering Societies of San Francisco

Chairman—C. D. Marx, Stanford University.

Secretary—Nathan Bowers, Rialto Bldg., San Francisco.

Joint Committee Technical Societies of Los Angeles

Chairman, George A. Damon, San Fernando Bldg., Los Angeles.

Secretary—W. K. Barnard, 705-6 Central Bldg., Los Angeles.

Utah Society of Engineers

President—Leonard Cahoon.

Secretary—Wm. H. Kelsey.

Meetings—3rd Wednesdays except May, June, July and August.

Annual banquet—May.

MISCELLANEOUS**American Ass'n for the Advancement of Science—Pacific Division**

President—John Campbell Merriam, University of California; Acting Chairman National Council of Research.

Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.

Meetings—Annual.

Portland Section A. S. C. E.

President—P. H. Dater, Eng. U. S. Forestry Service.

Secretary—C. P. Keyser, Park Bureau, Portland, Oregon.

Meetings—At call of president.

Spokane Engineering & Technical Ass'n

President—L. K. Armstrong, A. S. M. E.

Secretary—A. D. Butler, City Engineer, Spokane, Wash.

Meetings—Third Friday of each month. Joint with A. S. C. E., A. I. E. E. and A. S. M. E.

Foreign Trade Club

President—W. H. Hammer, Monadnock Bldg.

Secretary—Wm. E. Hague, Monadnock Bldg.

Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.

Pacific Coast Gas Association

President—John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.

Secretary—Henry Bostwick, 445 Sutter St., San Francisco.

Society for Promotion of Engineering Education

Secretary—F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

Los Angeles Transportation Association

President—C. G. Krueger, 324 S. Broadway, Los Angeles.

Secretary—D. W. Ferguson, 324 S. Broadway, Los Angeles.

HAPPENINGS IN THE INDUSTRY

NEW CONSTRUCTION IN COLORADO

Julesburg, Colo., is constructing a new power house which will supply power and light for Sedgewick and Ovid, Colo., as well as for Big Springs, Neb. The concrete building will contain in addition to the power plant, the Superintendent's office, council room, fire department and ice plant.

The power equipment is as follows:

Two 200 h.p. Heine boilers
Two 750 gal. per. min. centrifugal pumps.
Two 24 in. wells, concrete casings and strainers, or Kelley well systems.

Western Electric generator, 300 kva.
Old unit transferred to new plant, 150 kva.
Ames Uniflow Engine

The Henningsen Engineering Company of Omaha, Neb., are the Engineers.

In Julesburg a new White Way will be constructed through the main streets, consisting of ornamental poles and 100-watt lamps. Steam heat will be supplied to business blocks.

STATISTICS OF THE DOHERTY INTERESTS

The publication of statistics concerning the great electric power utilities of California in the Journal of Electricity for April 15, 1919, has called forth nation wide interest in this subject—especially the fact that the interconnected systems of the Pacific Gas & Electric Company and the Sierra & San Francisco Power Company constitute the greatest electrical network in the world with its billion and one half of kilowatt hours of energy delivered annually to consumers of electric power.

Another feature of interest that awakened nation wide attention was the dedication of that particular issue to H. M. Byllesby for his effective work, covered not in concentrated power service but in a system of widely separated yet efficient utility organizations.

Readers of the Journal of Electricity have long been familiar with the splendid accomplishments of the Denver Gas & Electric Company. Few, however, are aware of the details of the Henry P. Doherty organization, known as the Cities Service Company, of which the Denver Gas & Electric Company is a part.

This organization with its half a hundred subsidiary organizations in various communities of America is today in the aggregate, producing over seventeen million barrels of oil annually, forty-six billion feet of natural gas, six billion cubic feet of artificial gas, carrying over a hundred million passengers annually over its electric railways and selling electrical energy to the amount of over a half billion kilowatt hours.

To give our readers a full conception of the subsidiaries and communities served by the Cities Service Company, we append below the following:

Oil and Refineries

	1918	1917
Barrels of Oil Produced	17,032,693	11,675,505
Number of Oil Wells Owned	3,137	2,655
Daily Refining Capacity (Barrels of Crude Oil).....	33,585	33,585
Oil Storage Capacity in Barrels	6,447,541	5,997,887
Number of Tank Cars Owned and Leased	2,323	1,749
Number of Distributing Stations (Excluding Foreign Countries)	165	151

Natural Gas

Gas Sold in Cubic Feet	46,814,889,000	42,355,746,000
Number of Gas Wells Owned	2,181	1,914
Miles of Gas Mains Owned	4,529	3,818
Population Served	976,985	913,000

Artificial Gas

Sales in Cubic Feet	6,112,357,000	3,080,584,000
Twenty-four Hour Capacity in Cubic Feet	18,523,000	18,082,000
Number of Customers	103,041	96,269
Miles of Mains on 3-inch basis	1,748	1,631
Population Served	1,031,000	964,000

Electric Light and Power

Kilowatt-hours Sold	513,714,799	406,015,212
Kilowatts Installed Capacity	268,363	238,765
Kilowatts Connected Load	442,333	388,046
Number of Customers	169,618	144,399
Population Served	1,286,000	1,146,000

Electric Railways

Number of Passengers Carried	109,174,092	115,657,669
Miles of Track	407	374
Number of Cars Owned	908	849
Population Served	574,285	541,285

THE CARIBOU HYDROELECTRIC PROJECT

The Great Western Power Company has finished the preliminary engineering work on its great Caribou hydroelectric project, carrying all this out with its own engineers. A general plan of construction has been decided upon and the contract let to Stone & Webster of Boston. Work is now actually under way, with 150 men engaged in preliminary construction, a number that officials of the company say will be increased to over 1,000 men inside of a few weeks. If the work progresses according to schedule, the project will be completed within two years, the company having been successful in financing and having the means to carry it out to completion.

The transmission lines will carry 175,000 volts, which is a greater voltage than is now carried by any transmission system in the world, and this big load will be carried with safety, and security.

FIXING OF RE-SALE PRICES

The Federal Trade Commission in a special report to Congress has renewed its recommendation made last December that manufacturers be permitted by law to fix and maintain resale prices, subject to review by a disinterested agency.

The Commission says that such a law would remove present complexity in the business world, promote the efficiency of manufacturing and commercial institutions and serve the interest of the consuming public.

The Commission's recommendations, it stated, were based on the following conclusions:

- (1) That producers of identified goods should be protected in their intangible property right or good-will, created through years of fair dealing and of sustained quality of merchandise;
- (2) That the unlimited power both to fix and to enforce and maintain resale prices may not be made unlawful with safety; and
- (3) That unrestrained price-cutting is not in the public interest, and tends, in the long run, to impair, if not to destroy, the production and distribution of articles desirable to the public.

In endorsing the action of the Federal Trade Commission, the American Fair Trade League comments as follows:

The Colgate decision can only be effective in controlling retailers who buy directly from manufacturers. If a manufacturer sells to jobbers there is nothing to prevent the price cutting retailer from securing goods through jobbers and continuing to snap his fingers at the manufacturer's standard price policy. The difficulties of manufacturers dealing exclusively with the jobbing trade are really increased by the decision because of the advantage which it gives to producers selling exclusively through retailers.

Under the Commission recommendation, manufacturers desiring to fix and maintain resale prices would file with an agency to be designated by Congress, descriptions of their articles, contracts of sale, and the price schedules to be maintained. The disinterested agency would be charged with the duty, "upon complaint of any dealer or consumer or other party at interest," to review the terms of contracts and prices.

NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES

One feature of the coming Exposition of Chemical Industries to be held in Chicago, September 22nd to 27th, will be the number of electric furnace exhibits; all the foremost companies will be there. The activity of the war period produced an increased interest in metals, not only in new alloys and in treatment of metal but in the method of manufacture. It is a sign of the times that earlier interest in electric furnaces which was of a scientific interest, now has an industrial interest and plant men all over the country are turning their attention to this developed means of smelting metals.

The advancement of electrochemistry particularly as related to electric steel, brass, bronzes, and the furnaces used, has created an interest which reaches beyond the strictly electrochemical field, and we now find the American Institute of Mining & Metallurgical Engineers joining with the American Electrochemical Society in a meeting during the Exposition to discuss Electric Steel and Electric Furnaces; in the evening after the meeting a program of motion pictures upon various phases of electric furnaces in their operation will be shown at the Exposition.

Among the numerous instruments, devices and apparatus that will occupy no small space among the exhibits are those which have been perfected during the war period for precise measurements of temperature, weights, volumes, velocities, flow of liquids, gases, solids, electric current and any and all kinds of commodities that are to be measured. There will be many exhibits of engineering devices and articles of equipment for plants and factories in general; notable among these are conveying systems, elevating systems, weighing and measuring devices, tiering and stacking machinery as well as hoists and cranes.

There will be exhibits of the varied safety appliances used, and the United States Bureau of Mines will feature their safety work in the plant and the mine.

There is also being arranged a program of speakers and motion pictures by the Exposition managers; the speakers will be of national prominence; men of affairs from the midwest will be there to welcome the visitors from other parts of the country and speakers from the industries known to all our readers will be present.

Many exhibitors are bringing moving picture films they are now preparing.

The titles of some of the films to be shown are: "Continuous Motion Conveying, Stacking, Elevating, Loading and Unloading by Brown Portable Handling Machines—(Courtesy Brown Portable Conveying Machinery Company).

"Resistance Type Furnace for Melting Non-ferrous Metals," and "Electric Furnaces in the Heat Treatment of Essential War Materials"—(Courtesy of Electric Furnace Company).

"The Detroit Rocking Electric Melting Furnace in Operation,"—(Courtesy Shawinigan Water & Power Company).

"The Manufacture of Zinc Oxide,"—(Courtesy New Jersey Zinc Company).

The U. S. Government is now preparing through the Bureau of Mines, numerous technical subject films, embracing all of that Bureau's work. These will have their first showing at the Exposition.

PACIFIC GAS & ELECTRIC TRANSACTION

Arrangements have been concluded for the purchase by the Pacific Gas & Electric Company of the entire properties of the Northern California Power Company which supplies Shasta, Tehama, Butte, Colusa, and parts of Yolo and Trinity Counties with electric light and power.

"The Northern California Power Company has 525 miles of high-tension lines and 1611 miles of low-tension lines. It possesses a very valuable power site on the Pit river and owns six hydroelectric generating plants on Battle creek and Cow creek, with an aggregate installation of nearly 50,000 horsepower. At present the Northern is producing and marketing 30,000 horsepower of electric energy."

The Northern California Power Company has a capitalization of \$10,000,000 common stock, all outstanding. The

Company has received authority to issue \$2,000,000 of preferred stock. Its bonded indebtedness consists of \$3,964,000 consolidated bonds, \$937,000 underlying bonds and \$900,000 guaranteed bonds.

The terms of sale are \$34 a share upon a total issue of 100,000 shares.

RAILROAD COMMISSION DECISION

The Railroad Commission went on record against the practice of consumers demanding extension of service from utility companies and then charging the companies unreasonable prices for land necessary to carry out extensions.

In connection with the case of eleven farmers of Placer county, who had filed an action to compel the Pacific Gas & Electric Company to supply additional water for irrigation purposes, the Commission said:

"This Commission will not permit utilities to charge against their consumers reckless or extravagant expenditures, and neither will it force a utility to pay exorbitant prices for rights of way, such as are here demanded."

The Commission directed the Pacific Gas & Electric Company to make the necessary extensions for service before May 1, 1920, providing the company is able to secure the right of way at a reasonable figure before November 1, 1919.

NAVY YARD DEVELOPMENT

An interesting development took place at the League Island Navy Yard, Philadelphia, on July 1st, when the first heat of steel was made in the "Greaves-Etchells" furnace recently installed by the Electric Furnace Construction Company, Finance Building, Philadelphia, in the new foundry.

The foundry itself is said to be one of the most modern and up to date in the whole of the U. S. A., and the manufacture of steel in this yard opens up very interesting possibilities for larger future development.

TRADE NOTES**Electric Furnace Activities —**

The Electric Furnace Construction Company, Finance Bldg., Philadelphia, reports the receipt of the following orders for "Greaves-Etchells" Electric Furnaces:

Sullivan Machinery Co., Claremont, N. H., 1-ton furnace.

Imperial Japanese Mint, Osaka, Japan, furnace for manufacture of coinage bronze.

Western Contract —

Further evidence that our great West is coming into its own in the manufacturing world is provided in the recent award by one of the big Southern California power companies of the contract for the hydraulic units for two new installations. The units will be the largest ever installed on the Coast and will be built in San Francisco by the Pelton Water Wheel Company. The units are 22,500 h.p. capacity each. The consulting engineers, eastern men, familiar with eastern practice and manufacturing, awarded the contract to the local firm in the face of extremely keen competition.

New Business Connection —

The General Electric Company has acquired an interest in the Trumbull Electric Manufacturing Company, of Plainville, Conn. The present management of the Trumbull Electric Manufacturing Company still retains a financial interest in the company and will continue in active charge of its manufacturing and selling policy.

The Trumbull Electric Manufacturing Company has an enviable reputation, national in its scope, as large manufacturers of knife switches and safety-first iron box enclosed switches as well as a general line of miscellaneous supplies. The General Electric Company feels that an alliance between these two leading manufacturers of goods designed to promote the safety-first feature in service entrance switches, motor control devices, etc., will give considerable satisfaction not only to the present customers of the Trumbull Company,

whose name will remain unchanged, but to the trade in general.

New Installations —

The Sheridan Light & Power Company, of Sheridan, Ore., are installing an additional pair of horizontal turbines in their Willamina plant to increase their capacity 250 horsepower. The turbines are being furnished by the James Leffel Company.

The Colorado Power Company are putting in a new turbine installation at their Denver plant.

Distributors Appointed —

The Sierra Electric Company, San Francisco, California, have been appointed Pacific Coast distributors for the Chicago Solder Company, makers of Kester Self-Fluxing Wire Solder. Both Acid-Core and Rosin-Core Wire Solder will be carried in stock.

New Stores —

Walter Lassen and R. D. Colman have opened an electric shop in Bremerton, Washington.

The Electric Appliance Company, has moved from 118 Spring street, Seattle, to 1214 Third Ave., where a large store room has been fitted up for handling general electrical appliances. The company is specializing in washing and ironing machines.

The Trumbull Electric Manufacturing Company are making a large addition to their factory at Plainville, Conn., which will give them one-third more floor space. The new facilities to be installed will be devoted to the manufacture of safety switches.

Price Increase —

The Edison Storage Battery Supply Company announce an increase of price in all types of Edison Storage Batteries, on account of the prevailing high prices of labor and material. The increase approximated 10 per cent and became effective July 1, 1919.

New Offices —

H. Alex. Hibbard, General Sales Agent for the T & W Universal Plug Co., of Santa Ana, Cal., has opened offices at 9 So. Clinton St., Chicago, from which all business will be transacted for the eastern and middle states. Stock will be carried in Chicago, and shipments made from this point.

Change of Business —

The Holabird Electric Company have retired from the Electrical Jobbing business in Los Angeles and Southern California, and will devote their entire efforts to the sale of the products of the Ohio Brass Company, the Central Tube Company, and the Condit Manufacturing Company, distributors of Chase-Shawmut Fuses and Fuse Blocks. They will sell Central Tube and the Chase-Shawmut line only through the recognized Electrical Jobber, but will continue handling the Ohio Brass products directly to the customer.

Removal Notices —

The Wagner Electric Manufacturing Company, of St. Louis, announces the removal of its Philadelphia office, service station and warehouse to 1632-34 Sansom street.

The Booth-Hall Company, of Chicago, formerly of 2307-15 Archer Ave., have moved their sales and commercial offices to Rooms 1007-1008 Hearst Bldg., 326 West Madison Street.

TURBINE AND WATER WHEEL

A Letter to the Editor

A question has recently been raised regarding the use of the word "turbine" when referring to either of the two types of hydraulic prime movers now universally used.

The word "turbine" is the proper generic term for either

the impulse or reaction types, and not water-wheels, though early developments have influenced such use. A turbine, according to two standard dictionaries, is "a wheel turning on a vertical axis and driven by steam or water" (modern developments have modified this definition in that a turbine may be either vertical or horizontal). The authorities go further to define a reaction turbine as a "turbine in which the water passes axially and is discharged tangentially through buckets that move by its reaction," and an impulse turbine as "a turbine, the rotation of which is caused by water impinging against the buckets."

The term "water wheel," as its name implies, may be any form of wheel energized by water, but modern practice has practically discarded any but the impulse and reaction types. The word water-wheel has come to be used almost inseparably with the word Pelton, as indicating the impulse type of turbine, though it should be confined to the smaller units of standard design. Webster does not seem to give the word "waterwheel" a place in his work at all, while Funk and Wagnalls refer to a Pelton waterwheel as a "wheel in which the water is ejected at the nozzle under high pressure against the buckets."

The invention and development of the impulse type of wheel carried on under the supervision of Mr. Lester Pelton, has standardized the use of the term "Pelton Waterwheel" far beyond the efforts of the manufacturer to protect his goodwill endowment, and many times references have been made to competitive "Pelton Wheels."

The term "Pelton waterwheel" may be used when signifying the impulse type of turbine, but the words "wheel" or "waterwheel" alone are being discarded in favor of the word "turbine."

Very truly yours,

THE PELTON WATER WHEEL COMPANY

WATER RIGHT BIOGRAPHY—No. 1 J. C. STEVENS.

The West has led the world in the matter of effective water right legislation. The Journal of Electricity has carried this message to every quarter of civilization where water is a matter of prime importance, so that the writings of such men as John H. Lewis, C. E. Grunsky and A. E. Chandler are now on file in all the great libraries and universities. The result of this effective work has accomplished the introduction of these writings—notably those of A. E. Chandler—into our universities and colleges as text books on the study of water law for engineers.

In order that permanent records may be made of all those who have had a prominent part in water right evolution in the West, the Journal of Electricity will from time to time note brief biographical sketches of the leaders in this work.

Our first sketch will cover the activities of J. C. Stevens, consulting engineer, Spokane, Washington.

Mr. Stevens' life has been devoted to the study and development of water resources. He graduated in Civil Engineering at the University of Nebraska and was Assistant State Engineer of that State before coming to the Pacific Coast in 1906.

Mr. Stevens has held responsible engineering positions in the Government Service, last serving as District Engineer in charge of water supply investigations in the Pacific Northwest. During that period he began a series of reports on The Water Powers of the Cascade Range, published as Water Supply Papers of the U. S. Geological Survey.

He left the Government service in 1910 to engage in private practice. Just prior to the late war he spent nearly three years in Spain as engineer in charge of design and construction of extensive hydro-electric developments for the City of Barcelona and outlying districts. Upon his return to this country he was engineer in charge of the West Okanogan Valley Irrigation District projects, both situated in the State of Washington. He has since devoted his time to general consulting work in connection with irrigation, drainage and water power development.

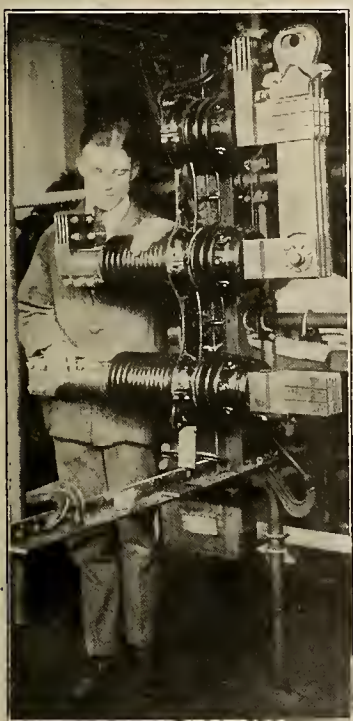
Mr. Stevens is a member of the American Society of Civil Engineers and the Oregon Society of Engineers. He was also a member of the Oregon Conservation Commission for three years and was one of the committee that drafted and secured the passage of the Oregon Water Code in 1909—a law that has become a model for all subsequent water right legislation. Aside from his engineering activities, Mr. Stevens is well known as the originator of the Stevens Water Stage Recorders and Indicators, a series of instruments for direct and long distance recording of water levels.

LATEST IN EVERYTHING ELECTRICAL

(The particular advantage of the electric lantern for all out-of-door uses makes the lanterns described below of special interest in vacation time. Among recent electrical devices for industrial needs, an extra large switch, a powerful electric locomotive, and a new headlight switch for railroad work are here presented. An ammeter adapted to any type of car is also described.—The Editor)

LARGE CAPACITY SWITCHES

Modern power house and Central Station construction is running into larger capacities on the higher voltages every day. The increased load, of course, means larger switches, not only by reason of the large amount of current to be carried on them, but principally on account of the very great mechanical stress possibilities when these busses and switching appliances are subjected to short circuit troubles.



This porcelain-mounted back connected switch is of 4,000 ampere capacity, and is designed to meet the demands of increasing capacities and higher voltages in power house and central station.

The switch here shown of 2,000 ampere capacity is an interesting example of recent switch construction and is probably the largest porcelain mounted, back connected, double throw switch that has so far been built. The forged terminals are shown in place, giving some indication of the bus arrangement on this particular job.

The switch, manufactured by the General Devices & Fittings Co., was installed in the power house of one of our large central states industrials.

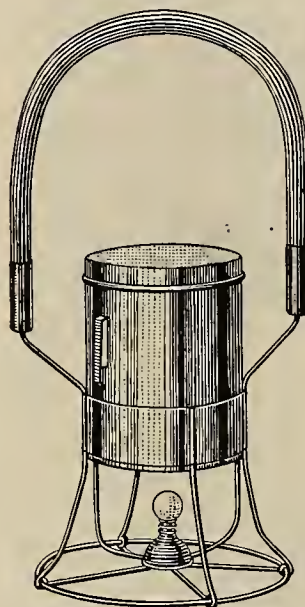
ELECTRIC LANTERNS

The danger of fire and the inconvenience of smoke and dirt which are features of the old oil lantern are eliminated in the electric lantern. A useful type of this electrical device has been developed by the Conger Lantern Company of 2656 Madison St., Portland, Oregon, in the shape of an "Automobile and General Purpose Electric Lantern."

It has a simple flash-light switch, and adjustable handle and a highly polished, non-tarnishing reflector on the bottom of the case holding the battery. Its size, 6½ by 4½ inches, makes it convenient to handle, and especially useful in auto-

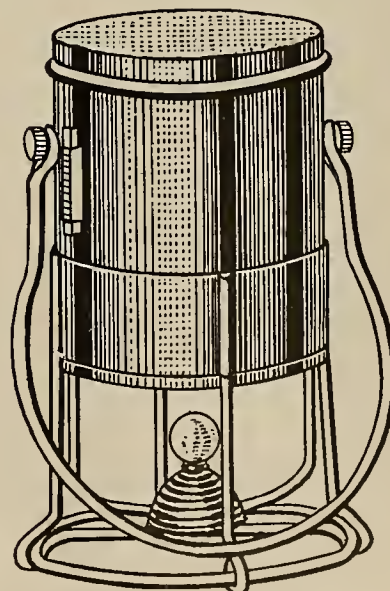
mobiling, camping and boating, and it is, of course, not affected by even the strongest wind.

The same company has designed a railroad electric lantern made on a similar plan but with a special rattan handle enabling trainmen to carry it with greater comfort and security than was possible with the old metal handle. The



The Conger Electric Railroad Lantern is designed especially for use by trainmen; the absence of smoke and grease, and of any flame which might be dangerous around cars containing explosive material, make this type of lantern particularly desirable for railroad work.

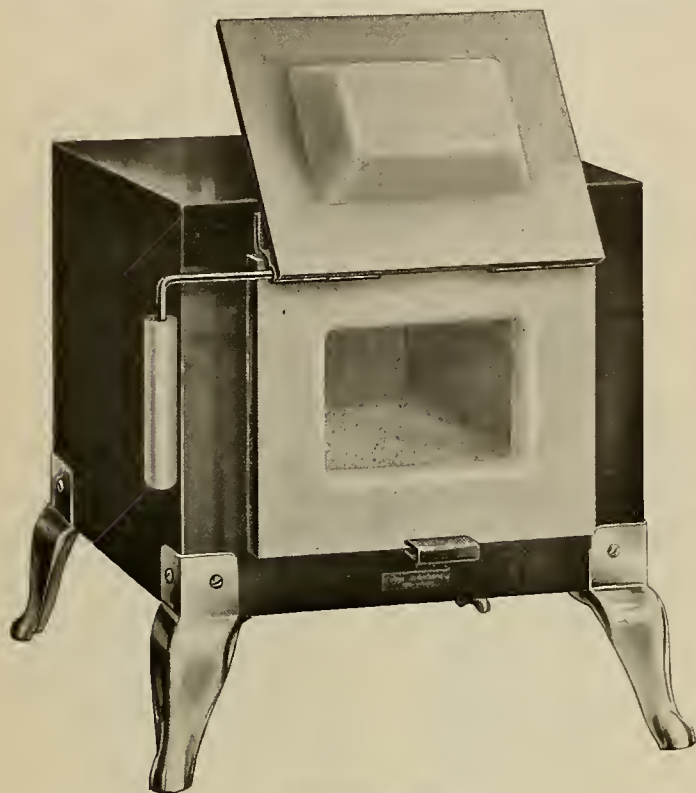
lantern is made especially strong, with steel wires, nickel-plated, and gives a remarkable volume of light. The battery used is a four-cell battery of the Railroad type.



The Conger Automobile and General Purpose Electric Lantern has a special advantage over the ordinary pocket flashlight for camping and automobiling. It can be hung up anywhere or stood on the ground, giving a bright light by which to work, and leaving the hands free.

ELECTRIC FURNACES

A variety of electric furnaces for industrial purposes are being manufactured by the Edison Electric Appliance Company. The Annealing Furnace shown in the illustration has been designed for treatment of carbon steels, for bluing, annealing and preheating high speed steel, where absence



Annealing Furnace

of scale or warping and elimination of dirt common to heating with gas or other fuels is an important consideration. This furnace is constructed to be of special value in work where an exact control of temperature is essential for perfect results.

An Apology

This item was run in our June 1st issue, but owing to a typographical error an extraneous caption was appended which read:

This end view shows the construction of the contact-making members—the are being broken horizontally rather than vertically

The notice and picture, with corrected caption, are here presented in their proper form by way of apology for the error.

THE "UNIVERSAL" AMMETER

A new device recently put on the market by the Roller-Smith Company of New York is the "Universal" Ammeter. The outstanding feature of this instrument is its universal application to all makes of cars, all makes and types of lighting and starting systems, and all voltage systems. With all the different makes of cars on the market and all the different voltage systems with which they are equipped, it is a very difficult matter for a jobber, dealer, service station or garage to recommend a suitable ammeter to a car owner who is in need of a device of that kind, the principal point being that the ordinary ammeter which is designed for lighting circuit work will not operate under conditions where the ammeter must be installed in the cranking circuit.

With the Roller-Smith "Universal" ammeter it does not make any difference what make and type of car and system is installed, as this instrument has been particularly designed for cranking circuit use and will operate satisfactorily under

any conditions. It can be connected in the starting circuit, if necessary, as in the case of certain single unit systems, and the cranking current, no matter how heavy, will not injure it.

The diameter of the body is 2 in., and the depth behind the flange $\frac{7}{8}$ in. Each ammeter is furnished with a full supply of mounting screws and nuts and washers.

A NEW SWITCH

A new locomotive Headlight Switch has made its appearance. It has a number of features that will quickly appeal not only to the master mechanic but to the engineer.

This headlight switch is a complete, self-contained, dust-tight switch that will effectively take the place of a double-throw knife switch for dim and full light, and a momentary contact switch for temporary dim light.

With an easy push the handle goes from "Off" to "Dim" and another slight push sends it to "Full." Going into "Dim" before going into "Full" gives the filament a chance to heat before coming to full glow. That means a long life for lamps.

While passing another locomotive or for picking up signals, it is not necessary to bring the switch back to the "Permanent Dim" position. The engineer merely pushes the handle from "Full" to "Temporary Dim" holding it until he has passed the other train or the signals, when he releases the handle and the switch automatically snaps back to "Full."

If going through a yard or city where the Headlight must be "Dim," a slight lift of the handle brings the Switch back to the permanent dim position.

This handy little Switch, which is manufactured by the Crouse-Hinds Company, of Syracuse, N. Y., can be mounted anywhere in the cab that is suitable. The mechanism cannot get out of order. The internal spring and the stops on the cover insure proper location of the Switch at the position desired, and make it impossible for the switch to stop between positions.

MOVING TONNAGE IN LARGE UNITS

The ability to increase track capacity requirements of heavy freight trains is fast becoming a difficult problem, owing to the tremendous increase in train tonnages to be moved as a unit. In other words, the problem before many steam railroad operators is how to increase the physical capacity of a certain heavy tonnage division without prohibitive expense. At the same time, after such an expenditure in correcting alignment, grade reductions and other operating difficulties, there still remains the problem of operation, namely hauling without delay the tonnage offered for transit.

With the introduction of the large FF1-250-ton locomotive of the Pennsylvania Railroad recently exhibited at the Master Mechanics and Master Car Builders Convention held at Atlantic City, new achievements are possible in moving heavy tonnage in large units over steep grades. The locomotive has a horsepower of 7600, with a sustained horsepower capacity of 4800 for one hour. With two of these engines a 6300 ton train can easily be handled up long grades at constant speed: for instance, on a 25-mile 1% grade such a train could be moved at 20.6 miles per hour.

The Pennsylvania FF1 locomotive was built within existing operating limits, reaching the maximum starting drawbar pull which average freight cars will permit, the maximum tractive effort consistent with the wheel arrangement used, the maximum weight on drivers, the maximum horsepower per unit weight, and the maximum speed considered desirable for contemplated operation.

This locomotive was designed under the general direction of Mr. J. T. Wallis, General Superintendent of Motive Power, Pennsylvania Railroad, together with Mr. B. G. Lamme, Chief Engineer, Westinghouse Electric & Manufacturing Company.

Books and Bulletins

Transformer Standards

A booklet on Transformer Standards just issued by the National Electric Light Association is the authoritative publication on the subject, covering types, frequencies, sizes, voltage ratings, taps and lead markings. It was prepared by the Electrical Apparatus Committee of the National Electric Light Association and is based on the cooperative effort of both operating companies and manufacturers.

The general adoption of these standards is now assured, and is expected to result in material benefit to users of transformers both standard and special.

Bureau of Mines

Bulletin 165 of the Bureau of Mines, "The Bibliography of Petroleum and Allied Substances in 1916," is the work of E. H. Burroughs. It follows the same general scheme as the 1915 bibliography, giving a list of all publications examined, technical journals and official publications, and classifying the material of the articles under geographical and subject-matter headings.

"The Method of Administering Leases of Iron Ore Deposits Belonging to the State of Minnesota," by J. R. Finlay, is Technical Paper 222 published by the Bureau of Mines.

Bulletins 177 and 179 of the Bureau of Mines are "The Decline and Ultimate Production of Oil Wells, with Notes on the Valuation of Oil Properties," and "Abstracts of Current Decisions on Mines and Mining, September-December, 1918." They are the work of Carl H. Beal and J. W. Thompson respectively. "Cost Keeping for Small Metals Mines" by J. C. Pickering, and "Metal Mine Accidents in the United States During the Calendar Year 1917" by Albert H. Fay, are the titles of Technical Papers 223 and 224 published by the Bureau of Mines. "Excerpts from Reports of Mineral Investigations of the Bureau of Mines for May, 1919," published by the Bureau in multigraph form, contains data compiled by J. E. Spurr.

Electric Furnace

An artistic booklet is issued by the Electric Furnace Construction Company, Finance Building, Philadelphia, describing and illustrating the Greaves-Etchells Electric Steel Furnace. It includes, also, a discussion of the various uses of the electric furnace, and a comparative table of output of furnaces.

Household Appliances

A novel illustrated folder is sent out by the Edison Electric Appliance Company for the assistance of distributors of the Hughes Electric Range. The Hotpoint Division of the same company issues a folder of sales helps for dealers in the Hotpoint household appliances. A parts list and parts price list of the latter appliances have also been issued.

The Electric Iron is the subject of a small 2-color folder sent out by the Cutler-Hammer Manufacturing Company of Milwaukee, Wis. It is entitled "The Aristocrat of the Laundry."

Electrical Gifts

The Commercial Section of the National Electric Light Association has arranged an attractive little Christmas folder on Electric Gifts, for use by the industry. Copies for distribution may be ordered through the Publication Committee of the Commercial Section.

Measurements of Gas and Air

The Cutler-Hammer Manufacturing Company of Milwaukee, Wis., sends out a 16-page two-color booklet entitled "The Value of Accurate Measurements of Gases and Air."

The booklet is well illustrated with numerous photographs and diagrams, and contains interesting data on the subject of gas measurement.

Annual Report

In spite of its strictly business-like title, the Eighth Annual Report of the Toronto Hydro-Electric System, recently issued, is a most pleasing booklet, artistically bound in buff and blue, and printed on heavy cream paper with numerous illustrations. It covers activities for the year 1918.

Bureau of Standards

The Bureau of Standards issues as Technologic Paper No. 119, "The Ultra Violet and Visible Transmission of Eye-Protective Glasses," the joint work of K. S. Gibson and H. J. McNicholas, Assistant Physicists, Bureau of Standards.

Label Series

The General Electric Company, of Schenectady, N. Y., has designed a new and attractive series of box labels for use by electrical dealers. The labels are of various sizes and each bears a picture, effectively executed in blue and orange, illustrating a single electrical convenience in actual use. They are effective in window displays, and on the boxes in the store interior they almost do the work of a salesman.

Centrifugal Pumps

An adequate and well-arranged booklet is issued by the Pelton Water Wheel Company describing and illustrating the essential features of the various designs of Pelton Centrifugal pumps, with suggestions on installing and operating, and a table of data on flooding land.

Labor Saving Devices

The Hurley Machine Company, of Chicago, publishes a comprehensive illustrated booklet dealing with Thor electric washing machines, ironing machines and vacuum cleaners. Complete descriptions of the various types are given, their prices, method of installation and operation, together with computations of the savings involved.

Electrical Insulation

A new booklet on their electric insulating material has been sent out by the Chicago Mica Company of Valparaiso, Indiana, covering moulding mica, plates, spools, brush holders, special rheostat insulation, oiled tapes, and numerous other developments.

From the Dolph Manufacturing Company of 95 Liberty St., New York, comes a useful card listing their insulating varnishes, with a solvent chart on the reverse side.

Miscellaneous

A descriptive booklet has been received from the Jewell Electrical Instrument Company, of Chicago, outlining their organization, factory plan, and new catalog, and listing their representatives.

A booklet with two-color illustrations on Nuttall gears for tractors is sent out by the Tractor Department of the R. D. Nuttall Company, Conway Building, Chicago.

The July 4th issue of the "C-H Messenger," the Cutler-Hammer publication, contains lists and photographs of Cutler-Hammer members in the service of the United States during the war.

The Benjamin Two-Way Plug and its uses are advertised in two new street car cards and an effective wall-hanger sent out by the Benjamin Electric Manufacturing Company of Chicago, Illinois.

The advantages of the Rex-Lite as a factory light are presented in a small folder issued by the Intermountain Electric Company of Fourth South St., Salt Lake City.

The National Metal Molding Company of Pittsburgh has sent out a large and effective folder on the subject of Inter-Connecting Metal Moldings.

NEW ELECTRICAL DEVELOPMENTS

(Extension of electric light service and new plant construction in Seattle feature in the Northwestern news, together with tentative plans for an electric railroad. City improvements, in service and equipment, are reported in the Pacific Central region. From the Pacific Southwest comes news of important bond issues connected with power development, while the Inter-mountain district shows activity along several lines, including street railway and lighting systems.—The Editor.)

THE PACIFIC NORTHWEST

SEATTLE, WASH.—The Seattle Electric Washer Company has been incorporated by Thomas A. Clynor and others for \$10,000.

TACOMA, WASH.—A \$300,000 bond issue for the purchase of the Lake Cushman power site will come up for vote on August 12.

SEATTLE, WASH.—The county commissioners have granted a permit to the Pacific Coast Coal Company for construction of an electric power transmission line from a point near Renton, along the Renton-Newcastle county road.

GRAND MOUND, WASH.—NePage, McKenny Company, Armour Building, Seattle, have been awarded the contract for electric wiring in the cottage being erected at the school for girls at this place by the State Board of Control at a cost of \$2957.

SALEM, ORE.—Articles of incorporation have been filed by the Sumpter Power & Water Company, capitalized at \$25,000, with headquarters in Baker, Ore. The incorporators are M. E. Weed and W. A. Weed, both of Oregon, and A. G. Smith of Washington.

PORTLAND, ORE.—Extension of steam and electric mains planned and now under construction by the Northwestern Electric Company will involve an expenditure of more than \$100,000, according to G. C. Pierce, vice-president and general manager of the company.

ESTACADA, ORE.—A number of surveyors and a crew of men are at work at South Fork. It is currently reported that the Pacific Railway, Light & Power Company is reviving the project of building a new power plant there, which was abandoned on account of the war.

SEATTLE, WASH.—The Puget Sound Traction Light & Power Company, Seattle, is remodeling completely the second floor of its large office building at Seventh avenue and Olive street, Seattle, to meet new conditions brought about by the sale of its street car lines to the city.

SALEM, ORE.—Approximately \$750,000 of the bonds for the Warm Springs irrigation district at Vale have already been sold and the additional \$400,000 now advertised will make \$1,500,000 to be applied to the completion of a dam and main canals for 29,000 acres at an average of \$46.60 an acre. Part of the water will be derived from Malheur river.

THE DALLES, ORE.—A special election held recently approved the \$65,000 improvement bonds submitted to the voters. The voters authorized the following improvements: the paving of the link from the east end of Second street at \$35,000; the paving of Upper Union, West Ninth, \$12,000; the construction of a concrete bridge over Mill Creek on West Sixth street, costing \$14,500.

BEND, ORE.—That extensive developments of the silica beds, 11 miles from Terrebonne, will be made this year by the Western Diatomite Company was indicated when the company presented a \$1000 check to be used in road improvement to the county court. Greatly increased hauling would necessitate putting the road in better condition, stated the letter which accompanied the check. The county already has \$5000 available for the work.

SALEM, ORE.—On a geological examination of the Benham Falls reservoir site in Deschutes county, to begin soon after the middle of the present month, depends the apportionment of

government money for construction of the big pond which is planned to feed water to more than 200,000 acres along the Deschutes river. The government money will be available, if the site is approved under a bill appropriating \$500,000,000 for drainage, irrigation and land settlement which doubtless will pass Congress shortly.

CORVALLIS, ORE.—Excavation has started for the \$70,000 engineering laboratory building at Oregon Agricultural College authorized by the legislature, the contract having been let to Hoover & McNeil, of Albany, at approximately \$70,000. J. V. Bennes, of Portland, is the architect. It will be a two-story structure with basement, 220 by 63 feet in size, of brick and concrete construction and resembling a modern industrial plant. The boiler for heating the building will furnish steam for use in the engines installed in the laboratory. Underground tanks will be installed with pumps for furnishing water to the hydraulic laboratory.

VANCOUVER, WASH.—Nine thousand acres of land will be drained this year in Clarke county, which includes the draining of Vancouver lake and Shallow pool. The work was authorized by the county commissioners at their regular monthly session. The work will be done under supervision of the state drainage engineer and will cost approximately \$65 an acre. When complete it is estimated the cost of the work will amount to \$600,000. Part of the cost will be shared by the property owners and no objections were put before the commissioners when the question was settled. There are about 100 residents of the county who own this property.

SEATTLE, WASH.—Proposing a plan by which the cost of extension of electric light service to residences not located on established circuits of the company will largely be borne by the consumer for whose benefit the extension is made, the Puget Sound Traction Light & Power Company, Seattle, has filed a schedule of tariffs with the public service commission which under the thirty-day provision of the law becomes effective August 8th if approved by the commission. The old tariffs are not changed as to the kilowatt hour consumption, but so as to affect the minimum rate charged the consumer who requires an extension to secure service.

TACOMA, WASH.—The Tacoma, Washington, city council has offered the Tacoma Railway & Power Company \$1,500,000 for its street car lines within the city, providing a vote of the people sanctions the purchase. Under the offer the railway company would also agree to finance a loan of a million dollars to the city for the purpose of putting the lines in first-class condition. In the past the railway and power company has placed a valuation of \$6,000,000 on its lines. The action of the council follows a recommendation of a committee of citizens appointed to consider the street railway problem. This committee decided that the lines would be unable to pay expenses under any fare that the people would stand.

SALEM, ORE.—Articles have been filed for the Portland & Southwestern Railway Company, by H. S. Huson and others, for \$2,000,000 to construct a railroad from the Boundary line of Portland through the Waldo Hills and Santiam section to Bend. While no announcement is made it is generally understood that the new railroad will depend upon electricity for its

motive power, leases for power site purposes having been obtained on Marion Lake in the Santiam National Forest in Curry county. Marion Lake has great power possibilities and is considered to have a potentiality of 30,000 to 40,000 horsepower. The railway company has its offices in Portland. The Myler Construction Company will build the line, according to report.

SEATTLE, WASH.—Construction of a steam plant adjoining the present plant on Lake Union has been authorized by the city council, the bill having passed favoring the extension and authorizing the issuance and sale of \$1,250,000 of light and power utility bonds to cover the cost. J. D. Ross, superintendent of lighting, gave to the council a communication setting forth an inquiry from the Tivani Steel Company asking the city if \$20,000 horsepower can be had at \$10 per horsepower for 5 years as an inducement for the company to build a steel plant in the city, the first unit to cost about \$5,000,000. An eight-bent concrete building 120 by 80 feet with full basement will house the new unit of the power plant. Plans are being prepared by City Architect Daniel Huntington.

THE PACIFIC CENTRAL DISTRICT

FRESNO, CAL.—The Pacific Gas & Electric Company is making improvements in Fresno. At the new plant the company is now building a warehouse, garage, machine shop and a big gas holder.

UKIAH, CAL.—S. H. Busch has contracted with Richard Carter for the construction of a dam on his property to impound the waters of Boyes Creek for irrigation purposes. The dam will be built of reinforced concrete and will be 50 feet long, 30 feet high and 5 feet wide at the base.

CHICO, CAL.—A group of Glenn county rice growers, who propose to construct a plant for the generation of power for their own use, have taken an option on the water right and power site of Denny Murphy on Deer Creek, near Polk Springs. Preliminary investigations have indicated that the project is feasible.

SAN FRANCISCO, CAL.—The supervisors have passed an ordinance granting permission to the Ocean Shore Railroad Company, a corporation, to construct a track leading from its track on 12th street to its property on Mission street, and requiring the company to perform certain work in connection therewith.

CHICO, CAL.—Chico will not purchase the electrical distributing system of Pacific Gas & Electric Company or the Northern California Power Company for operating a municipal power plant, but will build its own electrical distributing system and power plant. This decision was made by the Board of Trustees.

RICHMOND, CAL.—This city is considering the installation of 117 additional electroliters in the downtown district. Each of the proposed electroliters would cost \$47.50 per year to operate at 400 candlepower—a total of \$5557.50 per year for the entire system. The city council has ordered a survey of the light situation and a comparison of prices.

PITTSBURGH, CAL.—Six thousand acres of land north of the abandoned Solano City townsite, which is half-way between the Sacramento river and Sacramento City, on the line of the Oakland, Antioch and Eastern Railway, have been planted to rice. A new irrigation company

is being formed to irrigate about 40,000 acres of the old Solano Irrigated Farms Company's lands in that section.

DURHAM, CAL.—In an order issued by the Railroad Commission recently the Pacific Gas & Electric Company is authorized to purchase from J. A. and Edith Foster of Durham, Butte county, the Durham Light and Power Company. The Pacific Company is to pay for the plant \$15,000 cash and \$10,000 par value in fully paid shares of the first preferred capital stock of the gas company.

OROVILLE, CAL.—According to an announcement made here, at least 3000 men will be employed by the Great Western Power Company within the next few months near Lake Almanor, where a tunnel is to be constructed by that company to carry water to Butte Valley from Lake Almanor. A force of carpenters is now at work constructing bunk houses, kitchens and other accommodations for the workmen who will arrive in the near future.

MODESTO, CAL.—Directors of the Turlock and Modesto irrigation districts announce that they have acquired deeds or options on over 6000 acres of Tuolumne county land on the site of the proposed Don Pedro reservoir above Groveland. The reservoir will cover 6,760 acres, 744 acres of which are still to be purchased. The proposed dam will cost \$3,750,000. When completed it will impound 260,000 acre feet of water.

TERRA BELLA, CAL.—At the last meeting of the board of directors of the Terra Bella irrigation district, a tentative agreement was made with B. B. Harrison, president of the Canadian Investments of California, Inc., for the inclusion of 322 acres of foothill land in the district. This district will expend around \$20,000 in new equipment and rearrangement of pipe lines, in order to serve the lands to be included.

SAN FRANCISCO, CAL.—The Pacific Gas & Electric Company has under way plans for the addition of 15 feet to its dam at Lake Spaulding, one of the company's reservoirs above Emigrant Gap, near the summit of the Sierra Nevadas. In 1916 the dam was raised to the height of 260 feet above stream level and to a capacity of 63,900 acre feet. The addition, it is estimated, will make the capacity 65,000 to 66,000 acre feet.

FRESNO, CAL.—Power development on Kings river, which will eventually result in the construction of a \$50,000,000 project producing 200,000 horsepower, is beginning to take shape with the construction by five engineering crews of a road up the north fork to an elevation of 7800 ft. As soon as the \$5,000,000 San Joaquin River Kerchoff power project is completed in April, 1920, the equipment will be taken to the Kings River site, and the first unit of the 200,000 horsepower plant will be constructed.

MAYFIELD, CAL.—This town defeated by two votes a proposition to bond the city for \$20,000 for the purchase from the Pacific Gas & Electric Company of its distributing system here. It was proposed to take over this property and distribute light and power purchased at wholesale from the company. Bonds amounting to \$15,000 were voted by considerable majorities as follows: For erecting a town hall, \$5000; for sinking another well, \$5000, and \$5000 for extending and replacing water mains.

WILLOWS, CAL.—An eight-foot screw pump of the syphon type has arrived at the headgates of the Sacramento Valley West Side Canal Company and is being installed to supply more water for the canal system. The pump has a capacity of 350 second feet of water, weighs 10,000 pounds and requires a 450 horsepower motor to operate it. Upon the completion of the installation, which will require two or three weeks, two of the present turbine pumps will be put out of commission and held in reserve as auxiliary equipment.

THE PACIFIC SOUTHWEST

CALEXICO, CAL.—At an election held recently the proposal to issue \$325,000 in bonds to establish electric light and gas plants was defeated.

ANAHEIM, CAL.—The project for the Bolsa Drainage District Organization carried at a recent election. Steps will be taken at once on construction work.

AVALON, CAL.—Bonds to the amount of \$88,000 have been voted for the construction of an electric light plant and water works system, and \$55,000 for a gas plant.

LOS ANGELES, CAL.—The Board of Public Utilities has instructed the Los Angeles Railway Corporation to prepare for double-tracking its line on new Broadway between Tenth and Pico streets.

LOS ANGELES, CAL.—Application has been filed with the State Water Commission by Geo. Robinson for permission to appropriate one cubic foot per second of the waters of Nine Mile Canyon, Inyo county, for agricultural purposes. Diversion works to consist of a concrete dam 12 ft. high, 40 ft. long, and a one-mile pipe line. The estimated cost is \$5,000.

RIVERSIDE, CAL.—Southern Sierra Power Company has applied to the Railroad Commission for authority to issue \$620,246.52 par value first and refunding mortgage gold bonds, the issue representing 85 per cent of moneys expended by the corporation since December 1, 1914, in extensions, additions and betterments. The proceeds are to be used to reimburse the treasury.

LOS ANGELES, CAL.—The Railroad Commission has granted to the Southern California Edison Company authority to guarantee \$1,150,000 5 per cent serial bonds, to be issued by the Shaver Lake Lumber Company, a corporation to be formed in connection with the power company's plans to purchase the properties of the Fresno Flume and Lumber Company for use in a power development program. Under the plans of the utility the power company will acquire a reservoir site and properties which it can use in its hydroelectric development scheme, while the Shaver Lake Lumber Company will secure the timber lands and all other property. The company estimates the value of the properties, including the timber, at \$1,400,000. The time to issue 50,000 shares of its common capital stock has been extended to August 1, 1920. The time granted in the order authorizing the stock issue will expire on August 1 of this year.

THE INTER-MOUNTAIN DISTRICT

MINIDOKA, IDA.—Plans for a lighting system to be erected on four concrete posts in each block have been approved by the mayor and city council.

ELKO, NEV.—Arrangements are under way to establish a model village for the Indians, equipped with electric lights, city water, etc., and both a grammar and a high school.

SALT LAKE CITY, UTAH.—The Dixie Power Company has submitted to the Public Utilities Commission a standard form of contract to be used in soliciting all classes of new business. The new form has been approved by the Commission.

MILLVILLE, UTAH.—The town of Millville has advertised for bids for the construction of a complete electric distribution system for lighting the town. Current will probably be purchased at wholesale from the Utah Power & Light Company.

SALT LAKE CITY, UTAH.—Six new electric cars for the Salt Lake, Garfield and Western Railroad Company, for operation between Salt Lake City and Saltair Beach have arrived in this city and will be put in operation before the end of July.

SALT LAKE CITY, UTAH.—Plans are nearing completion for irrigation by the use of electric pumping plants of approximately 6000 acres

of land in the south end of Davis county, near Salt Lake City. Action was taken by the farmers of that district on account of the extremely dry season this year, which they do not care to experience again.

SALT LAKE CITY, UTAH.—To supply electric energy for machinery and trucks used in highway construction, the State Road Commission will erect a power line from Cedar City to St. George. The line will be constructed along the Dixie Power Company's right of way and later will be sold to the Dixie Power Company. Current for their operations will be furnished by the Dixie Company.

MORONI, UTAH.—The Big Springs Electric Company has petitioned the Public Utilities Commission of Utah for permission to abolish flat rates, which is one of the schedules charged by it for furnishing electric service. The company desires to have all of its patrons on a measured service basis and alleges wasteful and illegal use of current under the flat rate system. The company serves Fountain Green and Moroni with current.

SALT LAKE CITY, UTAH.—Owing to prompt action on the part of Utah Power & Light officials in releasing a large amount of water from storage in Bear Lake for irrigation purposes, a large number of the crops in the Bear Lake district have been saved from almost total loss on account of the extremely hot dry weather. The farmers in this district are very profuse in their praise of the kindness of the company officials for their assistance.

BUTTE, MONT.—The Montana Power Company is planning to extend its transmission lines to the east central agricultural belt of Montana. The Montana company will take over the plant of the Roundup Electric Company. The mining properties of the Republic and Roundup Coal Mining Companies, it is understood, will be equipped for electrical operation. Energy will be supplied by either the Great Falls power station or the Madison River plant, near Bozeman. The cost of the proposed work will be about \$500,000.

BEAVER CITY, UTAH.—Application for the use of 25 second feet of water from the Beaver River for power purposes has been filed with the State Engineer by Beaver City, through its mayor, D. I. Frazer. The city operates a municipal power plant and the service furnished has been declared unsatisfactory by certain protestants. Under the plans outlined in the application, the city would take 25 second feet from the Beaver River by a small diversion dam, convey it 15,000 feet along the stream in a pipe line 36 inches in diameter, and drop it over two six foot Pelton wheels under a 250 foot head. This will develop 400 horsepower.

DENVER, COLO.—By a decision, concurred in by four of the seven judges, the Colorado Supreme Court reaffirmed its former decision in the case of the city of Denver against the Mountain States Telephone and Telegraph Company and the Colorado Public Utilities Commission, involving the question of control of public service corporations in home-rule cities operating under charters granted by the twentieth amendment to the state constitution. Applied to Denver utilities, the decision means that the increase in telephone rates, in effect since July 1, 1918, is null and void; that the seven-cent car fare and one-cent transfer charge given the Tramway company is of no effect and that the Tramway company must comply with the five-cent fare ordered into effect by the city council recently; and that the Denver Gas & Electric Light Company again must furnish gas for domestic use at 80 cents net for each 1,000 cubic feet, and at 60 cents for each 1,000 cubic feet used for industrial purposes. While they realize they have nothing further to hope from the Colorado courts, the utility managers, it is reported, are already laying plans to litigate the question further by going into the federal courts.

THE VACUUM CLEANER

THE VACUUM CLEANER

A SCRAP OF PAPER started a war. The scraps of paper represented by these items among the rich treasure trove of the office Vacuum Cleaner are not so belligerent in their consequences, perhaps, but they are warranted to start something—if only a smile. This page is not an advertisement—it is not a deliberate funny page—it is made up of just those odd happenings of serious or comic import which usually are lost to any but conversational channels. The Vacuum Cleaner is the official collector of such scraps about the usual office and so it has been chosen as an appropriate sponsor for the matter here appearing.—The Editor.



Trapped by a secret sliding panel door, Walter Lacey, manager of the Western Electric Company, Oakland, Cal., was locked for hours recently in an inner chamber of a den in San Francisco's Chinatown that not even the police had heretofore known existed. The party of which Lacey was a member was being shown through Chinatown's underground by Policemen Emmet Moore and Walter Vogel. They were exploring the Siberia Club in Ross alley, one of the most notorious dens of its day. Moore's electric torch gave out. The two policemen went to get another light and asked the party to remain a moment in one of the lower rooms. One of the party had some matches. In exploring around with these he touched a secret spring. It opened a door which looked like the one through which they had entered. They passed through the door and it snapped shut behind them. They were trapped. It was not until the cries and shouts of the party were heard by a passing Chinese that they were released. It took half an hour to chop open the door with axes.

He doesn't, apparently as you may judge by reading the details below. The author is unknown, but we may credit Metal Trades with having been the first to discover him.

THE WAIL OF GOODY BOY

My parents forbade me to smoke
I don't.
Nor listen to a naughty joke
I don't.
They made it clear I must not wink
At pretty girls, nor even think
About intoxicating drink
I don't.
To dance or flirt is very wrong.
Wild youths chase women, wine and song
I don't.
I kiss no girls, not even one,
I do not know how it is done,
You wouldn't think I have much fun
I don't.

Author Unknown
(For obvious reasons).

The "cold shoulder" which we speak of today is reported to have entered our vocabulary by way of France. It seems that the tactful French once had a habit of serving a cold shoulder of mutton instead of hot meat to a guest who had stayed longer than he was welcome. We have other delicate hints in use under present custom, but the phrase, if not the fact, has maintained its significance of chilly lack of welcome.

The Tired Business Man, preferably in the electrical industry, is advised by the Boston News Bureau to take the following exercises regularly before breakfast:

HOW TO GET CARE AND TROUBLE OUT OF THE SYSTEM

1. Rise 7:00 a.m.
2. Stand in middle of room. Raise arms slowly overhead, take deep breath and say "Damn the Government," lowering arms in attitude of despair. Ten times.
3. Extend body, face downward, on floor. Cover eyes with hands. Kick heels, think of the railroads, and weep. Till Dry.
4. Kneel. Wring hands. Meditate upon the labor unions and groan, 150 times.
5. Assume sitting position. Hands on hips. Sway gently to and fro and concentrate upon Mr. Burleson until a generous frothing at the mouth sets in. Till exhausted.
6. Collapse on floor. Grovel vigorously. Think of the income tax and gnash teeth as in anger. Ad. Lib.
7. NOTE: Observe this simple regime every morning before breakfast and you will reach the office with most of the cares and troubles of the day already out of your system.

"Where they have to wash on Monday" is the title of a brief item copied by B. L. T. from the Rothsay, Minn., Enterprise. It reads:

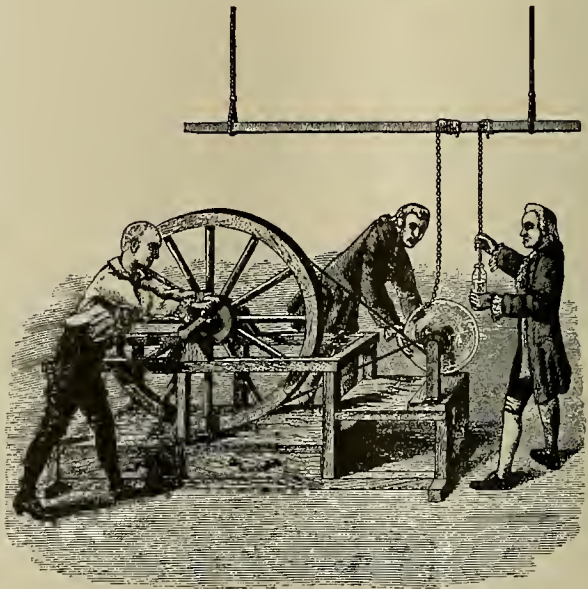
The Rothsay lighting power plant will be run every Tuesday in the future between the hours of 8 and 10 a.m., for the purpose of supplying current for the electric flat irons in use.

It is interesting to note that it is taken for granted all ironing is done electrically.

ENGINEERS OF YESTERDAY—14.

Van Musschenbroek

(Series compiled by A. L. Jordan)



Who attempted to "electrify water in a bottle" and said he would not take another such shock for the kingdom of France?

Pieter van Musschenbroek (whose native city, in Holland, gives us the name "Leyden Jar") in 1746 was experimenting with the frictional electric machine, invented by von Guericke, with the above results. The honor of this discovery he shares, however, with von Kleist of Pomerania, who made the discovery independently at about the same time. Another invention of Musschenbroek's is the pyrometer for high temperature measurements, based upon the expansion of a metallic rod.

N THIS ISSUE: Electrical Trade in Countries Bordering the Pacific

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JOURNAL OF ELECTRICITY

VOL. 43 NO. 4

SAN FRANCISCO, AUGUST 15, 1919

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The "Y" Girl, Big Sister to the American Doughboys

An "Honest-to-God American Girl," They Called Her

"Tell the Purchasing Agent to Look for Those Red Bands"

The boys out in the plant soon learn to trust the Red Bands of the Howell Red Band Motor.

One of the first things seen when the motor is unpacked is the little guarantee card which says:

"Every time you see a Howell Motor you will see the Red Bands on the ends of the housing. They are the visible evidence of our determination to keep faith with Howell Users in every corner of the world—they are your surety of motor performance."

Thus from the very beginning the consistent, day after day performance of the Howell Motor is closely associated with the Red Bands.

And that is why the unmistakable preference for the Howell Red Band motor among the men who are responsible for getting full production from motor driven equipment is so frequently expressed by the significant phrase "Tell the Purchasing Agent to Look for those Red Bands!"

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Horse Power*

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JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

CLOTILDE GRUNSKY, Associate

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NUMBER 4

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電氣事業所在地圖

大正七年八月末現在

THE ELECTRICAL INDUSTRY IN JAPAN.—It is fitting in this issue of the Journal of Electricity, devoted to comment on the growth of affairs electrical in the Orient and other countries bordering the Pacific, to feature the remarkable status of the electrical industry in Japan. Here is a map which by dots indicates the vast hydroelectric, steam electric and gas electric development in that country. There are at present 714 electric power companies with a total installed capacity of 1,176,123 kw. Of this 297,411 kw. is steam or gas and 878,712 kw. is hydroelectric. During the year ending April, 1919, there is shown for the year an increase of 27 companies engaged in the electric power business, an additional invested capital of \$31,116,928, and an increased installed capacity of 164,940 kw. Of this 19,744 kw. is steam or gas electric power, and 145,196 kw. is hydroelectric. Considering the fact that the area here involved is about the same as that of California and yet there dwell upon these islands some sixty million human souls, the comparison becomes even more interesting and remarkable.

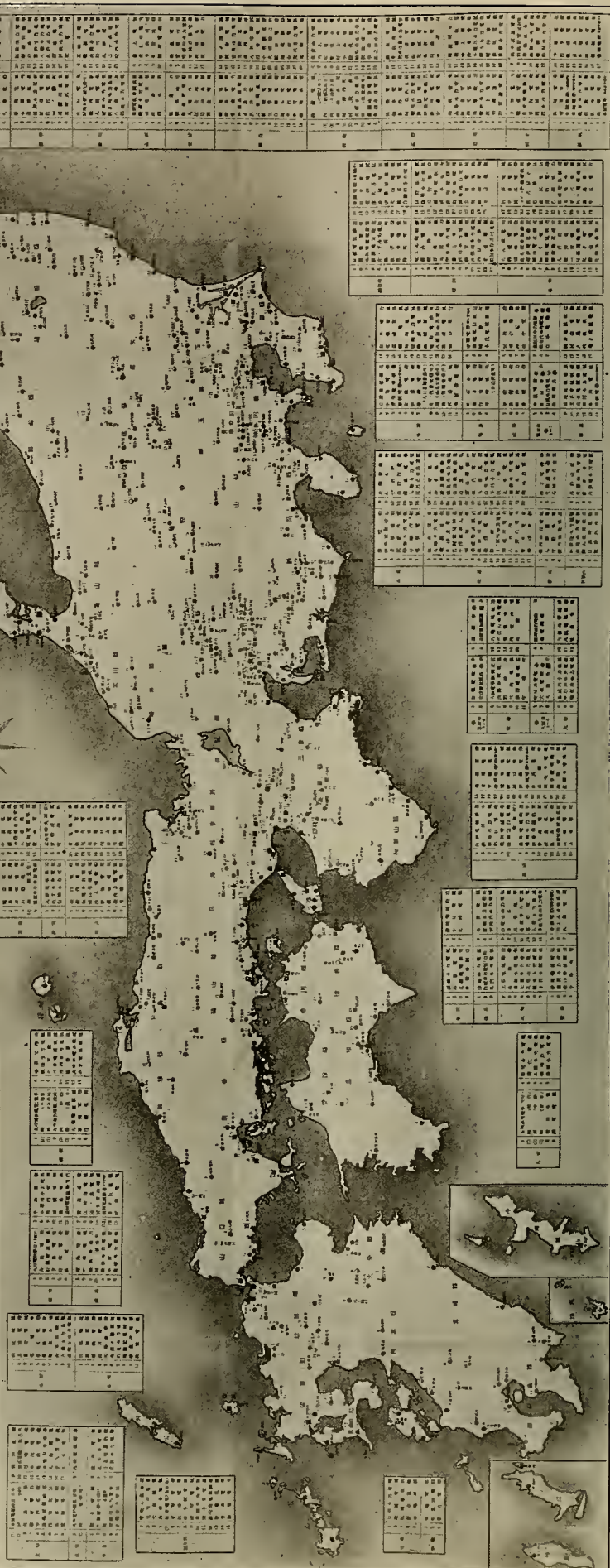
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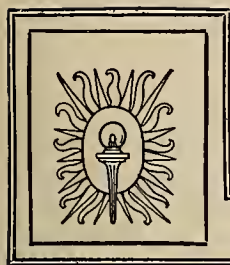
●	電力公司所在地
○	水力發電所
△	火力發電所
□	瓦斯發電所
◇	風力發電所
▽	太陽光發電所
◇	其他發電所

例

1. 電力公司所在地 (Electric Power Company Location)
 2. 水力發電所 (Hydroelectric Power Station)
 3. 火力發電所 (Thermal Power Station)
 4. 瓦斯發電所 (Gas Power Station)
 5. 風力發電所 (Wind Power Station)
 6. 太陽光發電所 (Solar Power Station)
 7. 其他發電所 (Other Power Station)

電力公司名稱	所在地	電力容量 (kw)
東京電力公司	東京	1,000,000
大阪電力公司	大阪	800,000
神戶電力公司	神戶	600,000
名古屋電力公司	名古屋	500,000
京都電力公司	京都	400,000
福岡電力公司	福岡	300,000
札幌電力公司	札幌	200,000
仙台電力公司	仙台	150,000
青森電力公司	青森	100,000
岩手電力公司	岩手	80,000
秋田電力公司	秋田	60,000
山形電力公司	山形	40,000
福島電力公司	福島	30,000
茨城電力公司	茨城	20,000
栃木電力公司	栃木	15,000
群馬電力公司	群馬	10,000
埼玉電力公司	埼玉	8,000
千葉電力公司	千葉	6,000
東京電力公司	東京	4,000
東京電力公司	東京	2,000
東京電力公司	東京	1,000





JOURNAL OF ELECTRICITY



DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43

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NO PERSON, GROUP OF PERSONS, OR NATION may think for one instant that anything underhanded, which may have slipped into the Treaty of Peace at Paris, either intentionally or unintentionally, will enable anyone to deal unrighteously or to advantage over other nations. The crowning triumph of the world war is found in the fact that an awakened consciousness now watches the actions of individuals and nations the world over, and woe to him who would attempt to bully a weaker nation or in any respect throttle the democracy of free peoples.

The West has been unusually interested in the crystallizing of the Bureau of Education and Research idea at the recent convention of the National Association of Electrical Contractors and Dealers at Milwaukee, as outlined in the editorial column of the Journal of Electricity June 15, 1919.

The work of the California Electrical Cooperative Campaign has already demonstrated the beneficial results of work of this sort. Sincerity of purpose, willingness to enter into broad constructive work, and a desire to grow away from the hermit idea in business method are fundamentals prerequisite for work of this nature. In proportion to the unadulterated injection of these ideals into the national movement will it find reward for the necessarily large sums of money to be expended. The Journal of Electricity believes that the broad vision of men such as that of W. L. Goodwin and W. H. Morton, who are today sponsoring this movement, merits the full cooperation of the industry.

Generally speaking, the movement met with unanimous endorsement. The main discussion concerned itself with the methods to be employed in carrying out the idea and to ways and means to be used in raising the necessary funds required in financing the undertaking.

Briefly summarizing the outcome of the discussion, the final decision was that the committee representing the manufacturers agreed to provide the national funds for carrying out the national work as previously outlined, with the understanding that the jobbers, central stations, and contractor-dealers would provide funds for the local cooperative work initiated by the National Association.

There is always promising work to be undertaken in a nation-wide movement such as this and this gives an opportunity to the manufacturer to benefit on national work done in behalf of improving trade conditions while the central station, jobber and contractor-dealer are, as they should be, allowed to confine their activities to the local field where contact with and knowledge of local situations are of vital importance.

Statistics recently compiled by the Ministry of Communication of Japan, as given out by Professor Gitaro Yamakawa of the electrical engineering department of the Tokyo Imperial University, who is now visiting this country, are very interesting.

In the matter of erection of water power, steam power and gas power plants, the statistics are listed under four headings. The cost includes power station lines and distribution circuits for consumers, as follows:

Station capacity in kilowatts	0-500	500-2500	2500-5000	Over 5000
Water power	\$438.50	\$306.50	\$246.50	\$153.50
Steam	481.50	356.00		331.50
Gas	503.50			

It will be noted that the average cost of power per kw. of installed capacity is slightly over one hundred and fifty dollars for installations above 5000 kw. This would seem to be remarkably cheap as compared with American installations where power lines and distribution systems are included.

Coming now to a consideration of average operating expenses, we have the following costs per kw-hr., inclusive of fuel, repair, oils, wastes, salaries and wages:

Station capacity in kilowatts	0-500	500-2500	2500-5000	Over 5000
Water	\$0.0244	\$0.0129	\$0.0025	\$0.0024
Steam	0.0348	0.0193		0.0130
Gas	0.0468			

One of the remarkable comparisons in this statement is to be found in the fourth column, where water power and steam generation costs are given for installations above 5000 kw.

Interconnection on a vast scale seems to be well under way at the present time and this will unquestionably reduce generating costs to lower figures and at the same time mean much for conservation of power and continuity of service. From Osaka, the great industrial center of Japan, on up to the north for a distance of two hundred and ten miles, an interconnected system is now being perfected that will tie in 90,000 kw. of installed capacity feeding into a trunk line of 125,000 volts. Electrification of railroads, too, will still further assist in interconnection. A private corporation is now applying for a

governmental franchise to construct a high speed electric railway from Tokyo to Osaka, a distance of two hundred and forty miles.

Taken as a whole, the situation in the electrical industry is in a very active state at present and many new triumphs in electrical engineering in Japan will undoubtedly result in early months ahead.

The vast population of Russia with its growing ambition, though thwarted, of life on a higher level of comfort, and with its destitute condition as regards manu-

The Possibilities of Russian Trade factured products, offers a most stupendous market for electrical products. A commercial representative of the Soviet Republic in this country appeals for a prompt renewal of trade with that country on the basis of a crying need, among other necessities, for electrical machinery, appliances and implements of all kinds. An American-Russian Chamber of Commerce representing the Kolchak government, with a more official recognition from American commercial interests, offers to furnish lists of reliable merchants in Russia, the articles most needed and what the Russians have to offer in exchange.

It is obvious, however, that with the political and financial uncertainties of the present Russian situation, a merchant must have guarantees, both of the safety of his goods and the value of the exchange he receives for them. The Canadian commission, whose findings are noted elsewhere in this issue, suggests a basis of barter as the only practical method of trade under present conditions. Great Britain has taken measures to aid in the reestablishing of Russian trade under government guarantee. The War Risks Insurance Office of the Board of Trade will now insure British goods in Russia and Russian goods bought by British houses for export against loss or damage arising from war risks, riots, civil commotions, etc. Facilities for marine insurance will also be given where this cannot be obtained through the ordinary channels. At present, according to the American Chamber of Commerce in London, the British government scheme covers only southeastern Russia and the northern Caucasus, although trade with the Allied zone in Siberia is also encouraged. This area, however, may be extended or varied as is found expedient in future.

American trade with Russia will undoubtedly for some time be confined to Siberia and the territory under Allied control. This is fed almost entirely through Vladivostok, and offers an unrivaled opportunity to Pacific Coast trade which will dare the difficulties to reap the harvest offered by a rich country starved of necessities.

So important a part has coal played in commercial and military supremacy, that the commercial standing of the great nations may in large measure be traced to their strategic positions in possession of the world's fuel.

The European Coal Shortage

The present alarming coal shortage of Europe not only has its electrical significance in the stimulus

it offers to prompt and general water power development, but has a special bearing on the commercial relationships of the United States, its growing merchant marine and its foreign trade.

Western and southern Europe is badly in need of coal. The deficiencies in the several countries have heretofore been supplied by Great Britain, who, owing to labor troubles and the increasing costs of mining her depleted stores, finds her coal production greatly reduced. It is today possible for American coal to be sold in England at a considerably lower figure than the English mined product. According to a recent statement in the London Times, the output for the year beginning July 16 next will be about 70 million tons less than that of 1913.

The total British exports in 1913 were 77 million tons. If the restrictions in the consumption of coal are removed on the basis of internal consumption of 1913, this would leave but seven million tons for export. As France, Italy, Sweden, Norway, and Spain have largely been dependent on Great Britain for fuel, it can be realized that the situation is a serious one apart from England's loss of practically its only raw product export. Considering the fact that France's normal output has been reduced some 41 million tons through obstruction of mines by the enemy and that Belgian production has been reduced through labor troubles, although the mines were not destroyed as is commonly supposed, the difficulty is the more apparent. Italy is in a desperate situation as regards fuel—and the need for this coming winter will be great throughout northern Europe. On a pre-war basis of consumption the following tabular statement gives the deficiency in the various countries in Western and Northern Europe which must be met by imports:

	Long tons (2240 lbs.)
France	20,000,000
Spain	3,650,000
Italy	9,650,000
Holland (other than supplies from Germany)	2,010,000
Sweden	4,560,000
Portugal	1,360,000
Norway	2,300,000
Mediterranean countries (other than Italy)	3,500,000
Denmark	3,030,000
Total.....	50,060,000

It is obvious that most of this must come from the United States, and it is also obvious that a great impetus in hydroelectric development must be felt the world over to meet the appalling deficit in the world's fuel resources.

There is always some dissatisfaction over the composition of nominating committees appointed to name the incoming officers for important engineering and technical societies, and indeed for any organization whose executive leadership is involved.

The Nominating Committee

In those organizations that involve large membership distributed over widely separated geographic districts it would seem that responsibility is best fixed by having a small committee—say a committee of five—elected from geographic districts properly proportioned, by compromising somewhat between per capita representation and geographic territory involved. The election of such a committee, in

which the local sections participate in the election of their particular representative, brings the sections together locally in a manner that is highly desirable. A committee of five composed in this manner is too small for cliques and yet it is remarkable how easily correspondence may be carried on concerning proposed candidates for office and the dispatch with which final discussions may be put through at the final meeting—certainly a strong recommendation in its favor.

The development of a healthy interest in the organization's affairs among outlying and growing districts of the particular organization is especially noticeable. The recently constituted nominating committee of the American Society of Mechanical Engineers is a forceful illustration. The five members of this committee initiated their work at the beginning of the year through correspondence and although perfect strangers to each other, their meeting at the Detroit gathering of the Society in June soon developed into an investigation of names in a manner that assured the most careful consideration of some two hundred names presented, although there were but seven officers to be nominated.

The slow awakening of China has largely been due to the retarding influences of a corrupt and backward government. According to Julean Arnold, United States commercial attache in China, an article by whom is reproduced on a later page, the outlook for progress in that country is bright.

In this connection, the late spectacular protest of Chinese students against government corruption is of interest as showing the growing power of this new and progressive element. This protest has taken the form of a general strike among the students. A recent letter from Hangchow reports that they have so far obtained the sympathy of the merchants that many shops are closed and the owners say they will not open until the demands are met. Signs are pasted on the doors, "Put out the country's thieves or we will not open our doors." The first great issue concerning Tsingtao and the Japanese boycott has now given place to a general campaign against corrupt officials. Even trains stopped for a time and people by the thousand are walking the streets.

The demonstration is remarkable in view of the strength among the younger element which is indicated. China's greatest need is a stable government which will not sell out the rights of its own people. With even a promise of this possibility, the progress in the forms and ideals of western civilization would sweep ahead like a stream which has been dammed.

Even as it is, the growing demand for electrical goods is but one evidence of a change which has slowly but surely been bettering the conditions of the whole vast country.

There are few electric street railways which have not felt the need for a greater income to meet increased expenses and which have not already applied for six-cent fares. Of these few, practically all are now in the act of making such application. The question is going through the preliminary stages of newspaper discussion in San Francisco; in Denver the extra fare was once granted and then withdrawn at the vigorous protest expressed at the polls by the public asked to pay the higher fare.

In many cases the public has expressed a rebellious attitude. Justice, of course, is on the side of the company which asks nothing more than a fair return based on the expense which must be incurred, but it is not always possible to secure justice at the hands of the public, in whom the court has decided authority rests, particularly when former controversies have in some measure disturbed the good feeling between the utility and the public.

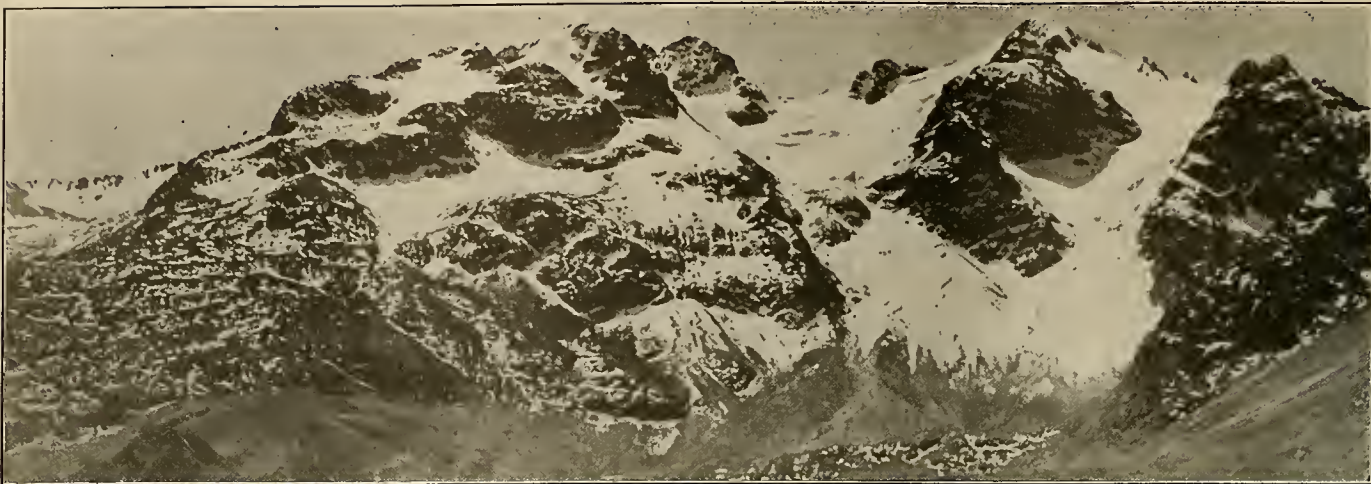
The zone method has been adopted in some cities to meet the need for increased revenue and at the same time preserve the convenience of a single coin, but the complications involved in the adopting of this system have militated against its application generally.

In this connection, attention is called to an article by C. E. Grunsky, the well-known valuation expert, which appeared some months past in the Journal of Electricity and which is now included in his book, "Public Utility Rate Fixing," recently published by the Technical Publishing Company. In this paper, Mr. Grunsky calls attention to the need for the community's granting an adequate recompense to the public utilities which serve it. He suggests that as the service rendered is of benefit to the entire community, some portion of the expense might fairly be borne by the taxpayer in the form of a remission of taxes to the utility.

A street car line benefits all property along its route, irrespective of the number of times the landowner rides on the cars; the mere fact that water service is available raises the value of land, whether the owner is connected to the mains or not. In strict justice the community should bear a portion of the burden of the return which is allowed the company. The more general recognition and application of this principle would enable the day of the six-cent fare to be indefinitely postponed.

THE NEW JOURNAL SERVICE: The Journal of Electricity has been undergoing a very rapid growth both editorially and in the breadth of territory served. The survey of electrical achievements and possibilities in the Pan-Pacific area which is the feature of this issue is typical of a wider service which is planned for future months. Further personal representation has been arranged both in this country and about the Pacific and the Journal of Electricity looks forward to a broader service in all fields.

A special Power Problem issue is planned for Sept. 1st which will contain an interesting review of some of the big new water power developments, as well as instances of effective steam power plant practice. Special attention is called to an article on "Cracking of Pin Type Corner Porcelain Insulators" by S. L. Foster, chief electrician of the United Railroads of San Francisco, which deals with an important insulator problem and which will be a feature of special interest in the Sept. 1st issue.



THE LA PLAYA DIVIDE

The precipitous slopes of the Andes rising abruptly to heights of from 16,000 to 20,000 ft. offer abundant water power and harbor as well rich mineral deposits, whose extraction calls for large orders of power house and mining machinery.

West Coast Electrical Trade With South America

(Although the importance of South America as a field for electrical goods may have been in some measure overestimated by American manufacturers, nevertheless the importance of mining and the growing industries west of the Andes offer an attractive field for Pacific trade. The conditions of the market with the disadvantages as well as opportunities of business conditions are here frankly presented in this report of the trade commissioner sent by the Bureau of Foreign and Domestic Commerce to investigate this field.—The Editor.)

So much has been said and written of late about South America as a market for goods made in the United States, that its importance may have been overestimated in the enthusiasm of those who are now for the first time learning about that continent. For this reason many electrical manufacturers have taken steps to enter the field in a manner that companies with more experience would call unwarranted. It is true that quantities of goods are used, and that in normal times there is a decided increase from year to year, so that it is equally unwise to underestimate the market. The aim of this article, therefore, is to present certain fundamental facts that may help the manufacturer to form an opinion regarding the extent to which he ought to push his products and something of the results he might reasonably expect.

The Western Coast

The continent of South America consists of 13 countries, no two of which are exactly alike, either topographically, economically, or politically. There is also a great difference in the characteristics of the inhabitants, their purchasing power, and their manner of living.

All the west-coast countries are mountainous, containing the high peaks of the Andes, and abounding in mines, small and large and in various stages of development. Some of the largest and most productive copper mines in the world are located in Chile, Bolivia, and Peru; hence, much of the heavy machinery imported is for this group. On the north coast Colombia and Venezuela have been making surprising progress in the last few years, and are now taking considerable quantities of insulated wire, lamps, and motors. These countries are mountainous over a large part of their territory; nevertheless, very little mining is being carried on, the sources of

wealth being chiefly coffee, bananas, hides, and other products of agriculture and cattle raising. Apparently the greatest development will be made along this last line. Much of the interior of both countries is unexplored.

The following table will give a comprehensive idea of how the world war has brought the United States to the front in South American trade. It will be worth the efforts that will be necessary to hold this same proportion when business shall have reached its normal point again.

ELECTRICAL IMPORTS IN SOUTH AMERICAN COUNTRIES

Countries	South American imports of electrical goods in 1913				Exports of electrical goods from United States in 1917-18
	Total	From United Kingdom	From Germany	From United States	
Argentina	\$9,756,234	\$3,358,711	\$4,892,538	\$ 577,126	\$2,626,163
Bolivia	612,022	200,349	297,464	5,922	33,522
Brazil	8,504,518	1,420,958	2,977,488	3,239,564	3,183,016
Colombia	159,343	20,000	10,000	127,929	284,298
Ecuador	150,000	2,500	2,500	100,550	100,033
British Guiana.....	35,000	10,000	10,000	10,000	41,372
Chile	2,288,292	346,141	1,636,215	194,834	2,162,887
Dutch Guiana.....	.....	.....	.....	.....	1,435
French Guiana .....	.....	.....	.....	.....	308
Paraguay	82,914	17,090	27,027	5,496	22,929
Peru	223,958	9,235	74,115	126,233	647,296
Uruguay	230,708	30,745	49,846	49,431	438,114
Venezuela	207,503	25,000	5,860	137,933	238,724
Total—Amount,	22,250,492	5,440,729	9,983,053	4,575,018	9,780,097
Per cent,	100.0	24.0	40.4	20.5	.....

Lower Purchasing Power of South America

The mistake is often made of taking it for granted that the average consuming capacity per capita is the same in South America as in North America. This is not true, and any selling estimate or campaign based on such false assumption is bound to result in disappointment. Briefly, the principal reason for this is that the South American countries being still in the pioneer stages of development, the

desires for modern luxuries or even conveniences are not yet so strong as in some other parts of the world. Moreover, as the wages paid are on a lower scale, while the prices of all imported articles are much higher than those of the country of origin, owing to the freight, duty, and other expenses incidental to importation, many things are quite out of reach of the greatest part of the inhabitants, even if they were educated up to their use. As an illustration of this situation, we may take the case of Peru, with a population of 4,500,000, of which it is estimated that 50 per cent are Indians, 35 per cent are half-breeds, Negroes, and Chinese, and only 15 per cent belong to the white race. Looked at in a most liberal manner, Peru as a market for electrical goods is no better than an American purchasing public of 100,000 people. This includes both the people as a whole and the foreign mining interests, whose annual business is a large proportion of the total. This is one of the extreme cases, but the same sort of allowances must be made for all countries.

The following table gives the area of each country, its population, and its estimated purchasing power expressed in terms of an equivalent population in the United States:

Countries	Area Sq.miles	Population	Equivalent population in United States
Argentina	1,153,400	8,000,000	3,250,000
Bolivia	514,464	2,535,000	200,000
Brazil	3,301,950	25,000,000	2,800,000
Chile	290,000	3,800,000	760,000
Colombia	494,340	6,000,000	55,000
British Guiana	89,420	300,000	6,000
Dutch Guiana	46,352	90,000	.....
French Guiana	31,550	50,000	.....
Ecuador	275,331	1,500,000	50,000
Paraguay	164,090	750,000	30,000
Peru	680,000	4,500,000	100,000
Uruguay	72,057	1,250,000	85,000
Venezuela	394,154	3,000,000	75,000

This equivalent is based on the 1914 Census of Manufacturers, which places the value of electrical machinery, apparatus, and supplies made in the United States at \$359,432,155. Allowing for an exportation of \$30,000,000, and a population of 100,000,000, the domestic per capita purchase of electrical material is \$3.29, while in South America it is less than \$0.50.

Electrical Goods in Chile

Although one of the smaller countries, Chile offers one of the best three markets for electrical goods. It has large and active mining developments



A GENERAL VIEW OF CUZCO, PERU

A glance at the character of dwellings and the absence of poles and wires indicates that electricity is not in common use among the inhabitants, in spite of the readily accessible water power. There is some industrial activity in the larger city of Lima.

and quantities of electrical material are employed in its nitrate fields. Many industries have been established under the stimulation of the abnormal

conditions of the last few years, and everything possible is being done to extend them.

In the section from Coquimbo to Valdivia there is an abundance of water power, and the government has created a commission to study the possibility of constructing a longitudinal artery for the transmis-



CHRISTMAS CELEBRATION IN BOLIVIA

For domestic purposes, the market of electrical goods is confined to the three or four major cities of each country, the greater proportion of the population being Indians, of the type shown above. They do not use electric toasters—nor washing machines.

sion of power throughout this stretch. If this can be done successfully, it will make available a large amount of cheap power, which, in turn, will greatly encourage the establishment of more industries.

Business Conditions

The two larger central stations are in Santiago and Valparaiso, and since they are owned by German capital, their whole influence has been used to exclude material other than that of German manufacture. Presumably they will continue the same policies.

There are several smaller independent telephone companies, but most of the more important places are controlled by the Chile Telephone Company, an English concern with headquarters in Santiago. It is preparing to replace much of the older equipment with modern material.

The Chilean government has taken steps already looking toward the electrification of three sections of its railway system, and if the entire program is carried out it will mean the installation of a large quantity of generating and power apparatus. This subject has been discussed for 10 years or more but will probably be brought to a successful conclusion eventually.

Owing to the fact that business can not be handled from one central point, as in Argentina, there are fewer exclusive electrical dealers, this business being handled by the central stations or by hardware and machinery houses. It is necessary to have representation in several of the important cities, each of which is a purchasing center for the surrounding district.

Conditions in Bolivia

The only users of electrical material in quantity in Bolivia are the mining companies, and as these

have been enjoying several years of prosperity, they will probably purchase more heavily than ever in the near future. Each has its own generating plant, operated by water power or petroleum engines. The number of motors installed is being increased constantly. Personal representation is necessary to obtain this business.

Under present conditions, there is little opportunity for the sale of anything but lamps and wiring material.

Industrial Uses in Peru

Electric power is used in the large and small mines of Peru, the oil fields, and the sugar plantations, all of which are following a program of expansion as fast as conditions will permit. In or near Lima a number of small industries also use electric power.

The street railway system in Lima and Arequipa, and the telephone company in Lima use American material exclusively. The Central Railroad has been making studies of the electrification of its line, but apparently has not found that conditions warrant such a movement.

A great majority of the inhabitants are Indians and half-breeds, living in the high inland plateau, so that the consumers of household and miscellaneous devices are confined to not more than 15 per cent of the population.

Colombia and Venezuela Undeveloped

Colombia and Venezuela are noted more for their agriculture and allied industries than for their mines, with the possible exception of the gold and platinum and emerald producing region of Colombia. Some power machinery has been installed for the extraction of gold, but, in general, mining is done by hand labor.

There are many small central stations scattered through the interior and the number is constantly being increased. There are numerous small waterfalls that can be used for developing electric power for the near-by towns, as well as several large sources of power that could be used only provided current-consuming industries were to be established near them.

Owing to the difficulties and expense of traveling, it is desirable to secure active local representatives, rather than attempt to cover the field with factory representatives.

General Conditions

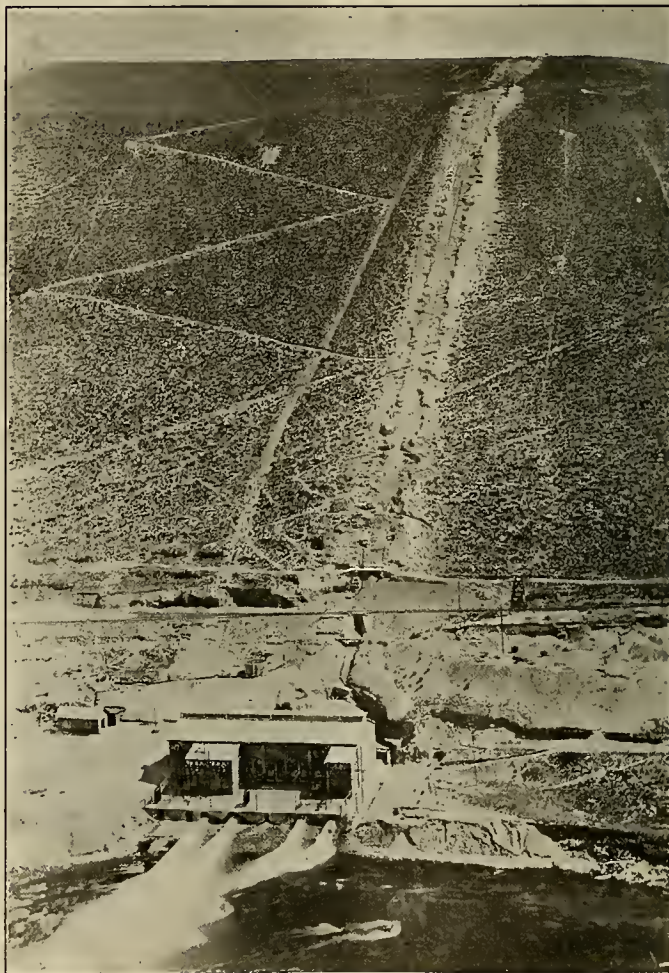
The climate of South America must be taken into consideration in these estimates, especially in regard to articles such as fans and heating devices. Nearly all the continent lies within the Tropics, but this does not mean that it is hot the year round. The altitude makes a great difference and much of the inhabited land reaches an elevation of 1,000 to 12,000 feet, so that even in places as near the Equator as Quito or Bogota, overcoats and blankets are not out of place at certain times of the year. At sea level the temperature on the west coast is not excessively high, owing to the prevailing westerly winds, which are chilled by contact with the cold ocean currents flowing northward from the Antarctic regions.

The natural tendency of the people as a whole

is toward conservatism; consequently, new devices are adopted very slowly. By many it is considered unhealthy to have artificial heat in homes and offices. This feeling is disappearing gradually, however, and an example is being set by hotels, office buildings, and modern apartments, which are now installing either some central heating system or means for local heating.

Such wiring rules as there are permit the use of European designs, which in many things, particularly wiring devices, are much cheaper than American. There is little prospect of a radical change in this situation at an early date, though there is a strong movement toward an elevation of standards. That this condition exists is not at all surprising, since for many years European factories and merchants have had agents and representatives on the ground advertising and pushing their goods. They have established strong banks and commercial houses in large and small cities, and have earned, through hard work, the trade that is theirs.

During the last three years American banks have been established in a number of cities, so that today there is no considerable importing center without one. Any manufacturer, therefore, who wishes to enter this field, will find that he is able to secure credit information through them, as well as much other assistance.



OROYA POWER HOUSE, PERU

With water power in close proximity to the mines, it is customary for each to have its own generating plant. Andes mines have been enjoying a period of great prosperity during the war period and are now undergoing a program of expansion. The power house in the view shown is at the highest elevation of any power house in the world.

Resuming Trade With Siberia

(Siberia with her depleted stock of manufactured articles, offers an eager market for electrical supplies and apparatus. To what extent the field is open and the conditions and possibilities of stable trading, formed the subject of recent investigation by a sub-committee on markets and supplies of the Canadian Economic Commission in Siberia. A portion of their report as it was reviewed by the U. S. Bureau of Commerce is here presented.—The Editor.)

Siberia proper, exclusive of Russian Central Asia and the Steppes, covers an area of 4,800,000 square miles. This territory stretches for a distance of approximately 6,000 miles from the Ural Mountains to the Pacific Ocean and is bordered on the north by the Arctic Ocean and on the south by the outposts of the Chinese Empire, along the Mongolian and Manchurian frontiers. Within the borders of Siberia are found fertile plains of black earth, grazing prairie lands, rolling downs, rugged plateaus, extensive forests, and frozen Arctic wastes. The territory is rich in agricultural resources, furs, minerals, and forest wealth.

Geographical Divisions of Siberia

Geographically and economically Siberia may be divided into three main divisions: Western Siberia, which comprises practically the whole of the watershed of the Ob River, is made up of the Provinces of Tobolsk and Tomsk and the districts of Akmo-linsk and Semipalatinsk.

Central Siberia stretches from west of the Yenisei River to Lake Baikal and comprises the Provinces of Yenisei and Irkutsk. Most of this section of Siberia consists of forest lands, with patches of arable land.

The third district into which Siberia may be divided economically is that which is known as the Russian Far East and stretches east from Lake Baikal to the Pacific Ocean. Commercially, eastern Siberia has always been distinct from the rest of the country. The trade has been controlled for the most part from Vladivostok, foreign goods being imported by sea, while western and central Siberia received supplies of foreign merchandise by rail through European Russia.

Eastern Siberia may be said to be the least developed portion of the country, but on the other hand this district is rich in resources, which should be utilized to a greater extent in the future. This will be reflected in a rapid growth of trade with the Pacific ports of Russia.

Figures taken from the Russian Year Book of January 1, 1913, give the population of Western Siberia as 7,533,000; central Siberia, 1,461,300; eastern Siberia, 1,720,000; total, 10,714,300. To the foregoing figures must be added a considerable immigration from European Russia. The total population of Siberia at the present time must be in the neighborhood of 14,000,000 people.

Importance of Agriculture

The bulk of the population of Siberia consists of peasants who are engaged chiefly in the raising of cereal crops but who also keep cattle, horses, and other stock. The proportion of peasants to the rest of the population is said to be over five to two. This fact must be borne in mind in connection with the supply of merchandise to Siberia. There is also a

limited trade in articles for consumption among the population of the towns, but in this connection it must be remembered that the general standard of civilization is not so high as in this country, while the purchasing power of the people is limited.

The Mining Industry

In addition to agriculture, the great resources of Siberia in minerals, forests, furs, and fisheries support a large part of the population. Mining is a most important industry throughout Siberia. The supply of machinery and equipment for the carrying on and extension of this industry must continue to be a trade of considerable proportions.

Industrial Development

The further development of the fisheries of the Russian Far East will lead to a demand for canning machinery and for a variety of supplies. The great dearth of all kinds of manufactured goods during the past few years has made Siberians realize the necessity for the establishment of home industries and for the utilization of the resources of the country in coal and iron. Inquiries are being made for machinery and equipment for the outfitting of textile plants, boot and shoe factories, clothing and shirt factories, button-making factories, leather plants, cigarette factories, meat canning and preserving plants, condensed-milk factories, vegetable-preserving plants, iron works, and factories producing agricultural tools and implements.

Present Obstacles to Trade

The chief obstacles to the relief of the present economic situation in Siberia are (1) the disorganization of transports and (2) the difficulties of financing shipments of goods purchased in foreign countries. The latter may be said to be dependent upon the former, so that the railway problem becomes the fundamental factor in the economic situation. There is said to be plenty of money in the hands of the peasants of Siberia, but they are unable to purchase with this money the articles which they require, owing to there being no goods on the market. The peasants are consequently reluctant to part with their produce so long as they can receive only more paper money in return.

The Siberian Market

Siberia is a market where cheapness is a consideration of great importance, owing to the limited purchasing power of the inhabitants, but quality must not be sacrificed for the sake of cheapness. Canadian and American goods enjoy a good reputation in Siberia, whereas Japanese manufacturers have spoiled the market for their goods in many lines by the poor quality of the articles that they have supplied.

Goods for Siberia should be securely packed to withstand rough handling on the railway and carriage into interior points off the railway. In this

respect the regulations regarding packing can safely be followed which apply to other export markets where transport conditions are similar.

In normal times the foreign-trade exchanges of western and central Siberia were conducted by way of the west; i. e., over the European land frontier, through the Baltic ports, the White Sea through Archangel, and to a certain extent the Black Sea ports. Eastern Siberia was dependent upon Vladivostok and the Amur River. The war, and subsequently the Bolshevik movement, has cut off Siberia from access to foreign countries through the Baltic and Black Sea ports, so that the whole country has become dependent upon Vladivostok.

Since the outbreak of the war the leading mercantile houses of western Siberia have found it necessary in their interests to open purchasing and forwarding agencies at the port of Vladivostok. There has also been a great increase in the number of independent trade organizations. Seven foreign banking institutions have established branches at Vladivostok.

The Cooperative Movement

The growth of the cooperative movement in recent years has made the cooperative societies the chief medium for the distribution of goods to the peasants of Siberia. The leading unions of cooperative societies have offices in Vladivostok. The cooperative societies in Siberia are of three kinds: (1) consumers' societies, (2) credit associations, and (3) producers' cooperatives. The cooperative unions may be said to embrace practically the whole of the peasantry of Siberia, and must therefore be considered the most important of the prospective purchasers.

The Principle of Barter

In addition to the cooperative societies, the provincial zemstvos, which are local-government bodies, undertake the distribution of agricultural machinery and other articles among the peasants.

For some time to come the principle of barter must be an important factor in the trade with Siberia. The development of the cooperative move-

ment has rendered this procedure both practicable and less open to objection than it would be in other circumstances. Trade operations will undoubtedly be facilitated if the foreign seller is prepared to accept Siberian produce in payment for his goods.

The chief exportable products of Siberia are butter, hides and skins, flax, wool, cheese, bacon, grain, furs, lumber, minerals, and fish products.

In spite of the activities of cooperative and official organizations there is still a wide field left for the legitimate enterprise of private firms, distributing goods in Siberia and collecting produce for export abroad. These firms must continue to be the chief medium for the distribution of supplies among the population of the towns.

Electrical Needs

The installation and improvement of electric light plants, telegraph systems, waterworks, sewerage, fire-fighting apparatus, roads, and tramways in the towns of Siberia will lead to a demand for a large amount of machinery and equipment. Siberian towns are behind in such civic undertakings, but the future should bring in a great advance along the lines indicated. The only street railway at present being operated is the municipal tramway of Vladivostok.

Before the war plans had been drawn up for the construction of electric street railways at Omsk, Tomsk, Irkutsk, and Harbin, where the need is great. These plans should be put into execution as soon as conditions become settled. Practically all the existing electric light and telephone systems require extension and repair, while all the larger towns need the installation of up-to-date waterworks and sewerage systems.

Among the articles for which particular demand exists in Siberia are named the following:

Wire	Mining machinery and equipment
Electrically driven pumps	Boot-factory equipment
Dynamos	Textile machinery
Electrical apparatus	Knitting machinery
Saw-mill machinery	Machine tools
Woodworking machines	General factory equipment
Flour-milling machinery	Lamps and lanterns
Paper-making machinery	Electric light fittings



The distribution of population in Russia and northern China. Density is indicated by depth of shading. It will be seen that Siberia has largely a rural population with a few darker spots on the sea coast. In 1912 only 162 towns in all of Russia were provided with electricity, most of these in the western area, but this report indicates that several cities contemplate the installation of electric lights and trolley systems as soon as material is available.

Hydroelectric Development in Canterbury, New Zealand

BY L. BIRKS

(The extent to which electricity is being successfully applied in every department of civic, industrial and domestic life in all parts of the world has a stimulating example in the rapidly-developed New Zealand power project described below. The author is chief electrical engineer with the department of Public Works, Wellington, New Zealand.—The Editor.)

The history of the development of hydroelectric power in Canterbury is of fundamental importance and interest not only to the residents of that province but to the whole of New Zealand, owing to its bearing on the corresponding developments throughout the Dominion.

In 1910 the demand for a comprehensive hydroelectric scheme became very urgent, but the question was still at issue as to whether it should be taken up



LAKE COLERIDGE FROM THE NORTH, SHOWING THE INTAKE

This lake, located some thirty miles from Christchurch, is ideally situated for the development of hydroelectric power to supply the entire region.

by the city or the government. At last a working basis was reached under which it was proposed that the City Corporation should retain the reticulation and retail distribution of energy within the city area, and that the government should undertake the development of the water-power, selling the energy in bulk to the city and retaining the right to supply to the railways, tramways, and to local authorities outside the city limits. Moreover, as part of a much larger system, the cost per horsepower both of installation and of operation would be substantially lower than from a smaller self-contained scheme limited to the city requirements.

Lake Coleridge

In August, 1910, the Aid to Water-Power Act was passed, and the Lake Coleridge scheme assumed a definite shape. Lake Coleridge has an area of about thirteen square miles, lying at an elevation of 1,667 ft. above the sea, and at a distance of sixty-five miles almost due west of Christchurch. The outlet of the lake is at the western end—that is, towards the mountains; and the outlet stream, carrying normally 100 to 200 cusecs of water, joins the Harper, then the Wilberforce, and then the Rakaia, doubling back to the south and east and flowing parallel to the lake for its entire length. At the eastern end the Rakaia River bed is 500 ft. below the lake level, and less than two miles distant from the lake shore, giving an ideal opportunity for the development of

hydroelectric power. In addition to the existing flow from the lake the supply of water can be supplemented when required by turning into it part or the whole of the flow of the Harper River, 400 to 800 cusecs, and the Acheron River, 30 to 60 cusecs. The available power for future development is thus very high, running up to 20,000 kw. of continuous load, or 40,000 kw. on a 50 per cent load factor.

From the lake the water is taken through the ridge separating it from the Rakaia River by a submerged tunnel, 7,000 ft. long and of semi-elliptic section, 8 ft. high and 8 ft. wide. The crown of the tunnel at the lake shore is 12 ft. below normal lake level, and has a grade of 1 in 1,000—that is, a fall of 7 ft. in the length.

The power house is a substantial ferro-concrete structure, 180 ft. long, 70 ft. wide, and 40 ft. high, and is built complete to house the whole 12,000 kw. of plant.

It is provided with complete lightning-arresters, traveling-crane, compressed-air system, transformer-oil drying and filtering system, machine-shop, fitter's shop, blacksmith's shop, stores, and garage.

The staff are provided with sixteen cottages, all equipped with complete electric lighting, heating and cooking systems. A suitable school, a small farm, and extensive plantation have been provided.

From the power house the energy is conveyed to Christchurch over two independent transmission lines, each sixty-two miles long, and terminating at the main distributing station at Addington.



ELECTRICITY FOR THE DAIRY

All of the dairies and butter factories within reach of the lines are supplied with electricity. Separators, churns and milking machines are electrically operated.

Large Consumers

The Christchurch city council takes control of the whole of the reticulation within the city boundaries, purchasing the energy in bulk from the

department at 15,500 volts pressure, and supplying their own transforming and distributing stations, at which the pressure is reduced to 400/230 volts, three-phase, for retail supply.

The immediate effect of the introduction of hydroelectric power was a striking reduction in the council's retail and wholesale charges for electricity. The demand within the city has gone up from about 700 kw. to 2,200 kw., and is still increasing rapidly. At the end of the last financial year there were 4,217 consumers connected to the city mains, and the connected load amounted to 8,817 kw.—that is, four times the maximum demand at any one time. That is to say, the city is able to sell the 2,200 kw. which it buys from the Department at least four times over to the different consumers during the day.

In illustration of the fact that electricity is the "poor man's light," 1,400 of the above consumers—that is, 33 per cent—pay less than 4s. per month, and 1,700—that is, less than 40 per cent—less than 5s. per month.

Next to the city council the largest consumer is the Christchurch Tramway Board. Their plant consists of two rotary converters, one of 1,000 kw. and one of 500 kw. capacity. Their normal day load is 1,400 kw. and their holiday peak is 1,700 kw. They also have five boilers of 2,000 kw. total capacity and four steam turbines of 2,500 kw. total capacity, which are maintained for emergency supply in case of accidental stoppage of the supply from Lake Coleridge. This steam plant is capable at short notice of carrying the whole tramway load, and also feeding back 500 to 1,000 kw. to Addington distributing station for the use of other essential services. The Lake Coleridge supply has reduced the cost of operating the trams by about £2,500 per annum, besides rendering it independent of the coal-supply.

Varied Applications

At Islington, Belfast, and Kaiapoi three large freezing works are supplied by means of indoor static transformer stations of 600 kw. and 300 kw. capacity from the primary feeders at distances of six to fifteen miles from the Addington distributing station. Their load consists mainly of large freezing-motors of 100 hp. to 500 hp., running on a seasonal load from November to about July in each year, but running twenty-four hours per day during most of the killing season.

Flour mills situated within the city boundary, and several outside the city are supplied from the primary feeders. The prices at which energy is available from Lake Coleridge have enabled the cost of milling-power to be reduced from about 4s. 6d. per ton to about 2s. per ton. Moreover, the absolute uniformity of speed and rotating effort of the electric motor as compared with the steam or gas engine has made a great improvement in the operation of the milling-machines, and there is a strong demand for extension of the mains to other milling centers.

All the seven tanneries and fellmongeries in the district, apart from the freezing-works, are supplied, in addition to steel-smelting, seed-cleaning and chemical plants.

The whole of the dairies and butter-factories

within reach of the mains are supplied, in spite of the necessity of keeping steam in most cases for scalding, washing, and pasteurizing. For separating and churning the steadiness and uniformity of speed are of great advantage as compared with the steam-engine. For milking-machines the ease of starting and stopping, and the unattended operation of the motors, as well as the cheapness of the power as compared with petrol or kerosene fuel, determine the matter without question, and are making quite a revolution in dairying wherever the mains are accessible.

The Tai Tapu Dairy Company has not only taken a supply for operating its butter-factory at Tai Tapu, but has installed a complete reticulation throughout the area occupied by its milk-suppliers. The resulting stimulus to the industry is already marked. When a farmer wants to select a site to settle down the convenience, economy, and comfort of an electric supply are decided factors.

Large quarries and brickyards are now driven by Lake Coleridge power. In these cases the large instantaneous overload capacity of the electric motor is of the utmost value. It is found in nearly every case that the former engines were very much overpowered for their average work, owing to the necessity of their carrying an occasional momentary overload without pulling up, which the electric motor does without difficulty.

Economy of Coal

A very important aspect of this subject is the economy of coal used in Canterbury as the result of the operation of the Lake Coleridge plant. To some considerable extent the electric power has replaced kerosene and petrol instead of coal, but to this extent the saving is of even greater national importance in that it has substantially reduced ocean and railway transport, and has reduced the national liability to foreign creditors by probably £10,000 per year.

Unlimited Possibilities

If the Lake Coleridge system did nothing more than supply one electric iron and one washing machine in every home in Canterbury it would justify a complete installation, perhaps not quite as large as the one that has been put in, but equally complete in every way, and would pay.

The future is unlimited. Every estimate that is made of the demand is doubled and trebled. A new application is developed, and all previous forecasts are left behind. The electrification of the railways is only one of numerous outlets. The railways themselves have a limit when every village has its electric service. The telephones have their limit when there is an instrument in every house. But when electric service is laid on to every house in the land the development of electric supply will be only commencing.

In the cities the business will be shared with the gas companies, but the great future of electric supply lies in the country districts—in the decentralization of our industries and the return of our people from the congestion of the cities to the healthier life and surroundings of the country.

China's Industrial and Commercial Outlook

BY JULEAN ARNOLD

(For those who have tended to regard China as a nation aloof from modern progress, as an immovable devotee of a hoary Asiatic culture, having little possibility of industrial development and less desire for it, the following sympathetic account will contain much that is new and encouraging. The obstacles to rapid development, and the progress which has been made in spite of them, together with an interesting range of possibilities for the future, should throw light on a number of hitherto disregarded aspects of China's growth. The author is American Commercial Attache at Peking.—The Editor.)

Many westerners today contrast unfavorably undeveloped, disorganized China with a well ordered and strongly ruled Japan, and rashly decree that China is fated evermore to remain undeveloped and disorganized unless some strong power from without imposes a dictatorship and orders the railroads built, the mines developed and all the material blessings of

organized, democratic pacifist people of China, among which are:

(1) The extensive area of the country, its continental nature, its natural barriers which have cut it off from contact with the outside world and its large population.

(2) The perpetuation through a period of many centuries of a system of education which, like the education of mediaeval Europe, directed the minds of the people to the past and cast the intellect of the nation in a mould. This system in China encouraged the development of individual, as represented by the family unit, rather than group or social activity.

(3) The lack of a military caste or an aristocracy which, when the need of change became apparent, might have assumed the leadership and hastened developments, as in the case of Japan. In democratic China progress must proceed from the bottom up rather than from the top down—a slower process.

Phenomenal Changes During Last Twenty Years

To those who continue to criticize China for what they term a lack of ability to do anything for itself, let us point to the phenomenal developments of the past twenty years, developments which show for little on the surface but speak volumes for the future because of their very depth. Among these may be mentioned:

(1) The abolition of the system of education based upon the classics and the substitution in its place of a system based on western models. This means that China is executing the order "about face" and looking into the future and away from the past.

(2) The development of a constitutional government has come as a result of China's contact with the west. The events of the past twenty years will be recorded in history as epoch making in their influence on the extension of constitutional and representative governments in the Far East.

(3) The rise and growth of the native press, which is quietly assuming an influential position in forming a public opinion among the Chinese people. Foreigners in China do not all appreciate the force of this army of educators represented by the native press which is in evidence in every city of China and which has had its inception since 1900.

(4) There is no one development in China during the past twenty years which lends more hope for the future or indicates more clearly that the people are sound at heart than the effective work which has been done by the Chinese themselves to rid their country of the curse of opium, and this in spite of the lack of a strong centralized government, in spite of its revolution and rebellions, and in spite of the efforts of certain interests to force the drug on the people.

(5) Probably the greatest development in China in its significance for the future is the growth of a national spirit which, as modern educational facilities increase, will go forth with greater strides.

How the West Can Help China

We have, then, in the above five factors making for progress in China, great essentials to the development of a free and strong people. With this foundation the west need not fear for the future of China so long as the west adopts an attitude of sympathy and establishes its relations in such a way that the principles of the open door and of equal opportunity become an actuality; and they cannot so become until all so-called "spheres of influence" are abolished and all foreign railways in China are inter-



A STREET IN MACAO

Not only did jin-rikshaws form the main means of conveyance in the streets of old China, but hand carts pushed along the roads carried produce for many miles to market. The chief evidence of China's awakening lies in the plans for better transportation both within the cities and without. China's potentialities in electric railways and hydroelectric power are extensive. So congested are the streets in this and the neighboring city of Canton, that it is planned to put an electric "tram" on the wall which surrounded the old city.

modern science and industry bestowed upon it against the protest of a people whose civilization, antedating that of all nations extant today, should entitle them to a voice in the matter.

Causes of China's Backwardness

It is because Japan has been able to do what it has during the past forty years that we should dispel pessimistic views regarding the future of its larger, wealthier western neighbor. Unsympathetic or superficial critics of the Chinese people fail to take cognizance of a number of factors which naturally have prevented rapid development among the loosely

nationalized and deprived of all political significance.

The per capita trade of the United States is \$85, thirty-four times that of China. China's foreign trade should exceed that of the United States, for it has a wealth of cheap labor potentially efficient, and the raw materials and natural resources in her own and contiguous territory. During the past 30 years China's foreign trade has increased tenfold in spite of unfavorable conditions. It may be expected that during the next 30 years it will increase another tenfold.

Must Develop Communication Facilities

To reach these figures in her foreign trade China must, in the first place, develop adequate communication facilities, which mean roads, railways, waterways, telegraphs and posts. Of equal importance with railways are good roads. The farmers of Shensi, on the rich fertile lands of the Wei Basin, raise 30 and 40 bushels of wheat to the acre, and because of their dependence on cart and pack animal transportation, which cost them from 8 to 18 cents Mex. a ton mile, they are unable to get this wheat to the Hankow or Shanghai markets, where it commands three times the price it does in Shensi. Thus the more they raise over and above their own wants, the worse off are they.

It is gratifying to note the growth of an interest in China in good roads. Beginnings have already been made. Foochow, Changsha, Tsinanfu, Peking and Shanghai have inaugurated work on good roads. In all of China there are less than 10,000 motor cars and less than 1,000 miles of good roads.

Foreign Railway Interests to be Internationalized

Unfortunately, the attitude of foreign nations toward railway building in China has not been conducive to developments in a larger way. The object of railway construction should be to open the country generally and to look for the returns from these larger developments rather than to treat the railway as a commercial asset in itself. Railway agreements have been so drawn as to present in actual practice obstacles to further railway developments on the part of other interests, and hundreds of thousands of square miles of fertile lands lie undeveloped and unoccupied in China because of lack of railway transportation facilities to render them accessible and open them to colonization and development.

Potentialities in Electrical Development

Another subject new to China is the electric railway and the development of its hydroelectric power possibilities. There are in operation in the United States 50,000 miles of electric railways, including city and suburban lines. Of a possible 60,000,000 hp. of hydroelectric power the United States has developed 6,500,000. China's potentialities in electric railways and in hydroelectric power are marvelous, but remain to be developed.

Waterway transportation in China is in some respects very advanced, for the reason that a large area and population have had to depend on it. No country in the world has as large a boating population as has China. Certain sections of the country

are networks of canals which reflect great credit upon China's engineering capacity centuries ago. Internally much can be done by coordination, conservancy and extension to improve China's wealth of waterways.

Communications also include telegraphs, cables, postal facilities and telephones, all of which add to the wealth-producing possibilities of a people. China has 11,000 miles of telegraph wire as compared to America's 1,627,000 miles, and in telephones the aggregate is probably less than 25,000, while New York City alone has 550,000.

Next in importance to transportation facilities are improvements in agriculture and industry. The foundation of China's prosperity depends upon its agricultural wealth. At present it is estimated that about 70 per cent of the population is agricultural as compared with 44 per cent in America. Nothing indicates more clearly developments in the United States in agriculture than does the fact that over 50,000 patents have been granted on agricultural implements and machinery.

During the next few decades farming in China will be revolutionized, if it keeps pace with the industrial and commercial progress of the country.

The following notice appeared in several Esperanto magazines recently to announce the plans of the Journal of Electricity in regard to the Esperanto matter appearing in this issue:

INTERNACIA KOMERCO KAJ INDUSTRIO

Esperanto kaj la Elektra Industrio

La laboro de la praktikuloj, kiuj celas la ekondukon de Esperanto en la komercadon internacian, ankoraŭ alportadas kontentigajn rezultojn. Dum preskaŭ unu jaro la "World Salesman" (Jokohamo) aperigas esperantan fakon, kaj nun, ŝajne kiel rezulto de tio, ni sciigas, ke la "Journal of Electricity" (San Francisco) intencas dediĉi kvin pagojn al nia lingvo en sia aŭgusta numero. Antaŭ kelkaj tagoj la C.C.L.C. londona ricevis tre afablan kaj interesan leteron de Sro. Robert Sibley, la redaktoro, kune kun ekzemplero de la "Journal." Kiel metia aŭ profesia gazeto, ĝi estas modelo de bonstila presarto; la centopa paĝaro enhavas multe da bele desegnitaj kaj okulfrapaj anoncoj de la plej gravaj firmoj en Usono; la teknikaj informoj kaj artikoloj liveras veran edukadon al ĉiuj interesataj pri elektraj aferoj.

Al ĉiu esperantisto-elektristo ni ne povas ne diri, "Akiru ĝin, prunte, ŝtele, aŭ abone, sed nepre ĝin posedu, precipe kiam aperos en ĝn Esperanto. Elektristoj, kiuj deziras pluan informon skribu al S. R. Marshall, Hon. Sek., C.C.L.C., Ludgate Circus, London, E.C. 4.



The eleventh international Esperanto conference was held in 1915 at the Panama-Pacific Exposition Grounds in San Francisco. The series was interrupted by the war disturbances, but will be resumed in 1920.

Esperanto as an International Language

BY W. R. DAINGERFIELD

(In view of the constantly expanding relationships of modern commercial life, anything which aims to simplify intercourse merits the attention of business and professional circles in all countries. The Journal of Electricity has under consideration a series of articles amounting to a brief course in Esperanto, and any comments on the subject from our readers will be welcomed. Should the idea meet with sufficient interest the series will probably begin in our next foreign issue.—The Editor.)

ESPERANTO

La unu precipa bono el la jaroj da mondsangado kaj batalado ĵus pasintaj estas la sento, disolviĝinta tra la civiliza mondo, ke necese estas, ke estu pli proksimigaj ligiloj de simpatio kaj interdonado de ideoj inter ĉiuj popoloj de la mondo. Komuna komerca lingvo estas la bezono de la nuna horo.

Esperanto ne estas intencita kiel universala lingvo laŭ senco ofenda, por esti konkuranto de la angla, franca, itala aŭ ia alia nacilingvo. Ĝi estas dua lingvo por ĉiuj utiloj, iom tiel, kiel la latina lingvo estis, tamen por pli limita celaro, aŭtaŭ tricent jaroj. Esperanto estas la solvintaĵo de la problemo pri la Turo de Babelo, kaj estas nomita "La Latina de Moderna Demokratic."

Estis 250 sensukcesaj provoj de la pasintag 250 jaroj solvi la malfacilogn naskitajn de la multecoj de lingvoj. Fine en 1887 Doktoro L. L. Zamenhof, polo okulisto, eldonis Esperanton, ĝin provinte kaj provadinte naŭ jarojn ĉe siaj amikoj. Li elektis radikojn komunajn a la ĉefaj eŭropaj lingvoj kiel bazfondon de Esperanto, forigis la neregulajn verbojn, malfacilan ortografion, kaj ĉiujn esceptojn de la reguloj de ĝia simpla gramatiko, kaj, per sistemo de prefiksoj kaj sufikdoj almetata a la radikoj, simpligis preskaŭ ĝis nekredbleco la vortaron de la ĉiutaga.

En 1905, kaj ĉiujare pste ĝis 1913 inkluzive, Esperanto kunvenigis naŭ internaciajn kongresojn, ĉiufoje malsamurbe. La dekan disrompis la erupcio de la tutmonda milito. La dekunua akazis kvazaŭ fragmente en 1915 ĉe la Ekspozicio en San-Francisko,

ENGLISH

The one great good of the years of world carnage and strife, just passed, is the feeling that has developed throughout the civilized world for the necessity of closer bonds of sympathy, and interchange of ideas among all peoples of the world. A common commercial language is the demand of the hour.

Esperanto is not intended as a universal language in the offensive sense of being a rival to English, French, Italian, Spanish, or any other national language. It is a second language for all purposes whatsoever, somewhat as Latin was, though for more limited purposes, three hundred years ago among the learned. Esperanto is the solution of the problem of the Tower of Babel, and has been called the Latin of Modern Democracy.

There have been about 250 unsuccessful attempts in the past 250 years to solve the difficulties caused by the diversity of languages. Finally, in 1887 Dr. L. L. Zamenhof, a Polish oculist, published Esperanto, after having tried and tested it for nine years among his friends. He selected roots common to the principal European languages, as a basis for Esperanto, abolished irregular verbs, difficult spelling and pronunciation, and all exceptions to the rules of its simple grammar, and by a system of prefixes and suffixes applied to the roots, he simplified the vocabulary of every-day life to an almost unbelievable extent.

In 1905 and each year thereafter, Esperanto has held, up to 1913 inclusive, nine international congresses, each time in a different city. The tenth was broken up by the outbreak of the world war. The eleventh was held in a fragmentary way in 1915 at the Exposition Grounds in San Francisco, and the

kaj la serio redaŭriĝos en la venonta jaro. Tiuj ci kongresoj estas montrilo al la tuta monda pri la utilo de Esperanto, kiel preta rapidega kaj ĝustiga komunikilo into ĉiuj nacioj, kaj inter homoj multjaraj kaj malmultjaraj, kleraj kaj malmultkleraj. Ĝi estas tute lernebla en de unu kvinono al unu kvindekono de la tempo bezonata de la franca, itala aŭ hispana lingvo.

Se ĉiuj infanoj civilizitaj komencus studadi Esperanton hodiaŭ, tiam en unu jaro post la venonta Kristnasko ili skribadus kaj paroladus inter si reciproke kun libereco kaj fluparoleco kiaj neniam praktike efektiviĝis ĉe fremlanda lingvo. La lingvaj baroj de la pasintaj epokegoj disrompiĝus.

series is to be resumed next year. These congresses are a demonstration to all the world of the utility of Esperanto as a ready, swift and accurate means of communication among all nationalities, and among persons of all ages and degrees of education. It can be learned thoroughly in from one-fifth to one-fiftieth the time necessary for French, Italian or Spanish.

If all the children of civilization should begin to study Esperanto today, then, by one year from next Christmas they would be writing to, and talking with one another with a freedom and fluency never practically realized in any foreign language. The barriers of the ages would be broken down.

Your Foreign Business Agent

(Do you realize the extent of the service which the U. S. Bureau of Foreign and Domestic Commerce is prepared to give you? The following review of its activities will suggest avenues of information along all lines of foreign trade of which the electrical exporter will wish to avail himself.—The Editor.)

The changed position of the United States in the business world demonstrates most conclusively the vast importance of foreign trade and the possibility of its expansion. This country is now a creditor instead of a debtor nation. During the past year the United States did an export business of about \$6,150,000,000, as against an import business of \$3,031,000,000. The month of January, 1919, showed the largest exports of any single month in American history, and every effort should be put forth to sustain and develop this great commerce with the buyers overseas.

The Bureau of Foreign and Domestic Commerce —

To that task the Bureau of Foreign and Domestic Commerce is dedicated. Figuratively, it may be said to have its finger-tips on all the markets of the world. To it, through the State Department, report more than 300 consular officers. The commercial attaches—sometimes called "trade diplomats"—are stationed in the principal capitals. Their activities have to do with the broad aspects of commercial matters, with policies and developments affecting whole regions, with the changing phases of international trade relations. Trade commissioners, on the other hand, are men with specialized commercial and technical training, who are selected to make trips abroad, studying in detail the markets for particular lines of goods, such as cotton goods and shoes.

Representatives of the Bureau of Foreign and Domestic Commerce go to Great Britain, France, Switzerland, Italy, Denmark, Norway and Sweden, Greece, Roumania, South America, Japan, and other countries as commercial attaches, to be attached to the United States embassies, while others are sent on special missions to investigate specific classes of merchandise, such as textiles, electrical goods, industrial machinery, and the like. For example, an electrical expert has gone to Madrid to make a special investigation, while another representative has undertaken an investigation into the need for industrial machinery in the Far East, including British India, China, and Japan.

Divisions of the Bureau —

The Bureau of Foreign and Domestic Commerce is made up of a number of divisions. The Division of Foreign Tariffs furnishes information concerning foreign tariff and customs laws and regulations, commercial policies of foreign countries, foreign trade-mark and patent laws, embargoes and import prohibitions, and foreign consular regulations. The Research Division supplies information on import and export statistics of all foreign countries; it does translating and research work of any sort connected with foreign trade. The Division of Statistics furnishes figures on the trade of the United States with all other foreign countries, the statistics being supplied monthly, quarterly, and yearly. The Far Eastern and Latin American Divisions provide information, in their respective fields, concerning markets for American products, general trade conditions, regulations affecting commercial travelers, the industries and resources of nations, and many other matters that are related, directly or indirectly, to the sale of American goods.

The information collected by the Bureau is distributed mainly through its district and cooperative offices, its Trade Information Division, and the publications issued by its Editorial Division.

The Trade Information Division furnishes to American business men a very great variety of information on foreign markets, including proper methods of packing, the financing of export shipments, the sources of foreign credit data, the names of dealers and importers abroad.

The Bureau maintains district offices in New York, Boston, Chicago, St. Louis, New Orleans, San Francisco, and Seattle, as well as cooperative offices in other cities. These offices are recognized centers for reliable information regarding domestic and foreign trade. They adjust trade differences. They render special service to foreign buyers seeking goods in the United States.

Commerce Reports —

Through the daily publication, Commerce Reports, and numerous special monographs, the Edi-

torial Division makes available to the business public information on commercial and industrial conditions in all parts of the world. This Government commercial newspaper is sent daily to more than 6,000 paid subscribers. It contains authoritative articles prepared by American representatives, excerpts and translations from foreign publications, commercial statistics compiled in the Department of Commerce, and brief items covering business conditions in all parts of the world. One of the most practical and immediately valuable features is the list of "Foreign Trade Opportunities"; American exporters who watch this list and take advantage of the openings mentioned in it are often able to sell large quantities of goods that would not otherwise have found their way to foreign markets.

The Bureau of Foreign and Domestic Commerce also issues many books and pamphlets (many of them appropriately illustrated), varying in size from 16 to 500 and 600 pages. These include general commercial handbooks, publications on foreign tariffs, and monographs presenting the detailed results of investigations into foreign markets for specific lines. Among the books being published are those entitled "Furniture Markets of Chile, Peru, Bolivia, and Ecuador," "Electrical Goods in China, Japan, and Vladivostok," "Construction Materials and Machinery in Chile, Peru, and Ecuador." These monographs, like others of the Special Agents, Special Consular, and Miscellaneous Series, are sold at nominal prices by the district and cooperative offices of the Bureau, as well as by the Superintendent of Documents, Government Printing Office, Washington, D. C.

Business Service —

No business is too small to derive benefit from the activities of the Bureau. No question, if genuinely pertinent to imports and exports, is too trivial to be investigated by its corps of workers. One day the Bureau may be called upon to answer an inquiry from an American canner: "Are skins taken from pimientos before they are ground into paprika?" The next day consideration may be given to the building of a railway, an electric power plant, or some other public work in Latin America or the Far East.

Here, then, is the Government agency through which American business men may learn the best methods of conducting export trade—the medium through which they may obtain definite, detailed information concerning the requirements of foreign markets.

The American Government has provided this organization. It is for American business men to understand its functions and take advantage of them.

THE FUTURE OF ELECTRICITY IN SHANGHAI

(A virtual barometer of industrial development in Shanghai is supplied by the records of the local power company. These show a steadily increasing demand for electric power in spite of war conditions. —The Editor.)

In spite of the war, the demands for electricity in Shanghai, China, have greatly increased during the past year, according to T. H. V. Aldridge, engi-

neer-in-chief of the Shanghai municipal electricity department, in a recent article appearing in the London Electrical Review.

The future of Shanghai depends on industrial development which, in turn, is dependent on electric power supply. China cannot expect much development of water power for the production of electric power; she is dependent upon coal for her industries, and is content to import it, although, as the following figures show, she is one of the three countries most richly endowed with coal resources:—

	Short tons
United States, including Alaska.....	4,231,352,000,000
Canada	1,360,535,000,000
China	1,097,436,000,000
Germany	466,665,000,000
Great Britain and Ireland, etc.....	208,922,000,000

China has a very long way to go before she can begin to approach the commercial and industrial activities of European countries, but she possesses two of the principal minerals—coal and iron—with which



The textile trade now furnishes the heaviest load of the Shanghai power company. China is evidently progressing from the hand to the power using stage.

to build up her state. If, as indications certainly suggest, Shanghai is to become increasingly important as a manufacturing center, it must have cheap electric power, and it cannot have that without cheap coal.

Since the Armistice there have been signs of renewed activities, which clearly show that an era of industrial expansion may be confidently looked for in the next year or two. The textile trade is, so far, the largest user of electric power, after which comes flour milling. It is significant that practically all the new mills and factories which have been established during the past five years operate by electric power purchased from the electricity department rather than from individual steam-power plants of their own. In the older mills, which are driven by steam power, the conversion from steam to electricity is gradually, but surely, taking place.

Shanghai, with cheap electric power, may yet develop into a steel-producing center. The city is better equipped and organized for manufacturing processes than any other city in China. Generally speaking, it is true that the prosperity of a city depends not only upon the magnitude of any one particular industry, but upon the diversity of industries, and on the recognition of this axiom and its practical application the future of Shanghai, as the first city of China, to no small extent depends.

THE FOREIGN TRADE CONVENTION

(The group which came together recently at Chicago to discuss the practical problems of foreign trade took a step of great significance to the west coast in deciding upon San Francisco as the scene of its next annual convention. Following is a summary of some of the principles taken up by the gathering, and of the outlook for the next year.—The Editor.)

By a unanimous vote of the sixth annual Foreign Trade Convention, recently held in Chicago, it was decided that next year's convention should take place in San Francisco.

Western Delegation —

A large western delegation attended the Chicago gathering, and did active and important committee work. The subjects taken up in convention were very varied, ranging all the way, according to one account "from the proper method of packing a box for export, to the most difficult problems of international finance."

Meetings —

Besides the formal meetings there were group meetings at which the various subjects were discussed intensively; in addition, anyone interested could receive personal advice from experts in the various lines, and large numbers took advantage of the privilege.

Foreign Trade and the Pacific Coast —

The particular interest of California in foreign trade is at present that of the import and export rather than that of a manufacturing community. For this reason, the railroad rates established for export and import commodities are of special interest to the West; and the fact that these also affect the trans-continental shipment of iron and steel products necessary for the profitable loading of outgoing ships, induced the western representatives to make special efforts to bring the point home.

Representatives from Seattle, Portland and San Francisco had an audience with the chief of the Traffic Bureau of the Railroad Administration, who was of opinion that the interests of the Railroad Administration also pointed to moderate transcontinental rates, and agreed to receive further data from a committee of Pacific Coast experts then in Washington.

The need for a continued shipbuilding program and increased maritime activity was among the strongly accented points of the convention. It is believed that if sufficient tonnage were available on the Pacific Coast, regular lines would be operated with a view to economical trans-oceanic shipment of grains, fruit and other produce. Foreign trade is unnecessarily limited by directing all or most sea-going commerce through eastern ports.

General Sentiments —

A summary of the outstanding sentiments of the convention includes the following:

1. The need for a continuation of a progressive and intelligent shipbuilding program that would release the ships at a fair valuation to private owner-

ship, to be operated with some degree of government support.

2. The return of the railroads to private ownership.

3. The restoration of the telegraphs.

The Seventh Convention —

The next annual convention will undoubtedly bring an exceptionally large and representative gathering to the Pacific Coast. The Chicago vote showed that the idea was received with the greatest enthusiasm, and it is expected that numbers of those attending will make the seventh annual convention the occasion of a prolonged visit to this section of the country.

A UNIQUE HYDROELECTRIC INSTALLATION AT BOMBAY

(Peculiar conditions in countries having an irregular rainfall and a long dry season must be met by special developments in the way of hydroelectric installation. An interesting example of this is provided by the Bombay plant described below.—The Editor.)

A hydroelectric plant located some 2,000 feet above and about 40 miles from Bombay, which must meet conditions under which the water courses are dry for nine months of the year, is described by R. B. Joyner in a recent paper before the Institute of Civil Engineers, as reported in *Engineering and Contracting*.

It was found necessary to provide sufficient storage to give about 100,000 hp. for 10 hours or 12 hours a day during about nine months of the year when no rain falls. Lakes are formed by four masonry dams ranging from about $\frac{3}{4}$ of a mile long and 34½ ft. high to about 1½ miles long and 96 ft. high. The "monsoon" lake formed by two of these suffices to provide power for three months or more continuously, while the others are for storage, and maintain the supply during the eight or nine rainless months. The combined available capacities of the storage lakes is about 10,100,000,000 cu. ft., the excess over the necessary 6,700,000,000 cu. ft. being allowed on account of the very variable amounts of the monsoon rains.

From the monsoon lake and from the two storage lakes two ducts lead to the top of the rocky wall bounding the Deccan plateau on the west. From there two lines of steel pipe lines lead the water down the precipitous slopes to the power house some 1,750 ft. below. The pipes at the top are 82½ in. in diameter, and 72 in. at about two-thirds of the distance down, where they are joined by a double swan-neck pipe. From this eight smaller pipes are led down to the power house, each supplying a Pelton-wheel turbine designed to give a maximum of 13,500 horsepower.

These works are the largest of several similar hydroelectric works which have been constructed during the past decade, and are the first works to store water for power for use during about three-fourths of the year. One of the masonry dams, on an estimate of the exposed face area, is probably the largest yet constructed.

The Undeveloped Water Powers of Japan

BY HACHIJI HIGO

(A most complete survey of the available water powers of Japan has been undertaken by the Japanese government, a foresighted step which reflects the favorable attitude with which that country regards the electrical industry. It is predicted that a large section of the government railway is soon to be electrified and other large projects are contemplated. The following data formed part of the official report of the director-general of the Bureau of Electrical Exploitation of Japan.—The Editor.)

Purpose of the Survey —

In order to investigate all possibilities for hydroelectric power sites for industrial purposes, and to collect necessary and reliable data for the future hydroelectric undertakings in Japan, a survey of water powers has been undertaken. The work in-



About 970,000 hp. in hydroelectric power is already generated in Japan and the present survey contemplates an additional 2,558,000 hp. possible of development. The above picture shows the 115,000-volt oil switches for the Inawashiro Hydroelectric Power Company near Tokyo, Japan, and is typical of the large scale on which these enterprises are being carried out.

cludes the investigation of the power sites, their available heads and discharge of rivers throughout the country. It was begun in June of 1918 and appropriations have been made for its continuance through five years.

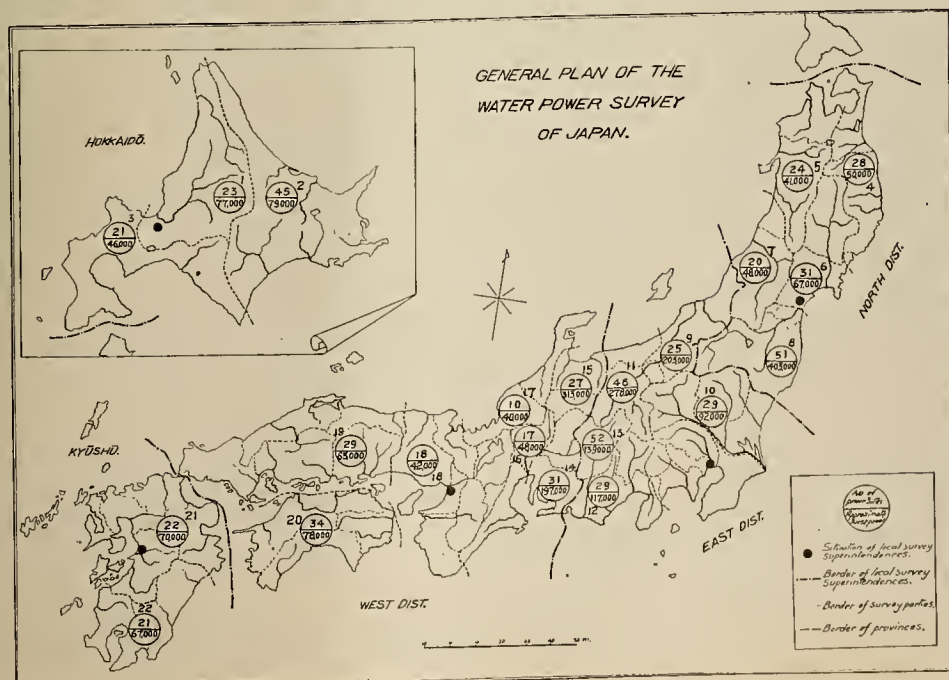
Organization and Plans —

The necessary regulations and general plan for the survey have already been formulated. An additional Water Power Section for superintending the survey has been added to the Bureau of Electrical Exploitation and five District Water Power Sections have been established. Some twenty-two survey parties have been carrying out the survey throughout the country. Some survey parties have completed their construction work of gauges, etc., and commenced the survey of the water-flows. Because of the extraordinary rise of wages and the price of material, especially the peculiar difficulties of the work in mountain and forest ranges, the survey was not a little prevented from rapid progress.

The program for the selection of the power sites and the establishment of gauging stations and the meteorological observatories, to be accomplished in the course of the reconnaissance, is given in the accompanying table and is to be completed by the end of September, 1919.

The Power Sites to be Surveyed —

The power sites to be surveyed by the Survey are those where more than 1,000 hp. at draft can be acquired by economical exploitation. In Japan, a little more than 1,000,000 hp. in water power is already utilized for the generating of electricity, and about 2,000,000 hp. is under lease for development, about half being already developed or in process thereof; while about 5,000,000 hp. has not yet been placed under exploitation, although it is estimated to be worthy of future economical development.



The water power survey of Japan as outlined in the contemplated plans. The upper figure in the circles represents the number of power sites to be located within the section indicated by the dotted lines. The lower figure is that of the approximate horsepower possible of development. This totals over two million — with possibilities of a still higher result when finally carried out.

PROGRAM OF WATER POWER INVESTIGATIONS

Name of District	Survey Party	No. River-Basins within the District	No. Rivers within the District	Power Sites to be selected within the District	Approx. Water Power at the Power Sites		No. Gauging Stations to be fixed				No. Meteorological Observatories to be fixed		
					Draft Hp.	Average Hp.	A	B	C	Total	New	Old	Total
HOKKAIDO—	1st	1	12	23	77,000	175,000	3	5	4	12	10	11	21
	2nd	9	21	45	79,000	141,000	5	9	7	21	13	12	25
	3rd	7	8	21	46,000	85,000	4	3	3	10	5	8	13
	Total,	17	41	89	202,000	401,000	12	17	14	43	28	31	59
NORTHERN—	4th	8	13	28	50,000	97,000	4	5	2	11	5	16	21
	5th	5	13	24	41,000	82,000	6	5	5	16	7	25	32
	6th	2	13	31	67,000	134,000	5	7	3	15	6	27	33
	7th	3	9	20	48,000	98,000	5	4	1	10	3	23	26
	8th	6	23	51	403,000	912,000	6	9	3	18	14	22	36
	Total,	24	71	154	609,000	1,323,000	26	30	14	70	35	113	148
EASTERN—	9th	4	14	25	203,000	394,000	4	6	3	13	8	10	18
	10th	6	15	29	92,000	163,000	5	10	1	16	3	42	45
	11th	6	26	48	278,000	527,000	6	10	6	22	12	25	37
	12th	4	15	29	117,000	247,000	4	7	2	13	2	26	28
	13th	2	25	52	139,000	275,000	4	7	7	18	6	14	20
	Total,	22	95	183	829,000	1,606,000	23	40	19	82	31	117	148
WESTERN—	14th	3	15	31	197,000	391,000	5	5	3	13	5	30	35
	15th	4	13	27	313,000	619,000	4	7	3	14	7	18	25
	16th	1	6	17	48,000	119,000	2	5	2	9	1	16	17
	17th	3	8	10	40,000	86,000	2	4	2	8	1	16	17
	18th	8	12	18	42,000	97,000	5	5	1	11	10	63	73
	19th	12	20	29	63,000	136,000	6	13	2	21	16	57	73
	20th	9	22	34	78,000	179,000	6	8	5	19	14	34	48
	Total,	40	96	166	781,000	1,627,000	30	47	18	95	54	234	288
KYUSHU—	21st	8	14	22	70,000	133,000	4	8	4	16	8	33	41
	22nd	9	13	21	67,000	130,000	5	8	1	14	10	22	32
	Total,	17	27	43	137,000	263,000	9	16	5	30	18	55	73
Grand total		120	330	635	2,558,000	5,220,000	100	150	70	320	166	550	716

Establishing American Engineering Standards

(The importance of an established standard for the various elements of engineering work is not only of importance to the country itself, but greatly simplifies international relations and export conditions. A big step forward has been taken in the formation of an American Engineering Standards Committee through the national engineering societies in cooperation with the government. The details and aims of this organization are presented below.—The Editor.)

In many lines of engineering much excellent standardization work had been done before the war; the war emphasized its importance and showed most clearly the need of cooperation to prevent the confusion caused by the promulgation of overlapping standards by independent bodies. During the war the Government Departments coordinated these efforts in certain lines and greatly assisted in unifying them. The American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers and American Society for Testing Materials, recognizing the value of what had been done, invited the Government Departments of War, Navy and Commerce to appoint representatives to act with them to continue this work. The body so formed is the American Standards Committee.

The American Engineering Standards Committee has just completed and adopted a revision of its Constitution which has been sent to the Governing Boards of all the departments and societies represented on the Committee with a request for its ratification.

The American Engineering Standards Association

The new Constitution changes the name to American Engineering Standards Association, the change from "Committee" to "Association" more fittingly indicating the wide scope of the interests involved.

The objects of the Association are stated as follows:

1. To unify and simplify the methods of arriving at engineering standards, to secure cooperation between various organizations and to prevent duplication of standardization work;
2. To promulgate rules for the development and adoption of standards;
3. To receive and pass upon recommendations for standards submitted as provided in the Rules of Procedure, but not to initiate, define or develop the details of any particular standard;
4. To act as a means of intercommunication between organizations and individuals interested in the problems of standardization;
5. To give an international status to approved American engineering standards;
6. To cooperate with similar organizations in other countries and to promote international standardization.

Means are provided for increasing the number of representatives in the Association by invitation or on request. Several important organizations interested in standardization will be invited to appoint representatives as soon as the necessary power is obtained.

The routine work of the Association will be conducted by its secretary under the direction of a board of directors. This board will have power to deal with all the affairs of the Association except the final approval of the standards submitted to it.

Sponsor Societies

Any organization may request the Association to approve standards which it has formulated, or to approve committees that it has appointed, and by so doing becomes a Sponsor Society. Such a request is entirely at the option of the organization that has formulated or expects to formulate the standard. At the request of the Sponsor, approval of the standards

is given when they are the substantially unanimous conclusions of a committee made up as follows:

(a) Sectional Committees dealing with standards of a commercial character (specifications, shop practices, etc.) shall be made up of representatives of producers, consumers and general interests, no one of these interests to form a majority. A producer is a person, or the representative of a firm or corporation, directly concerned in the production of the commodity involved. A consumer is a person, or the representative of a firm or corporation, that uses the commodity involved, but is not directly concerned with its production. General interests include independent engineers, educators, and persons who are neither consumers nor producers, as defined above.

(b) Sectional Committees dealing with standards of a scientific or non-commercial character shall consist of persons specially qualified, without regard to their affiliations.

Methods of Procedure

It is anticipated that in nearly all cases the approval of standards and committees by the Association will be requested. In case it is considered advisable, the Association is authorized to call a meeting of those who would be interested in the formulation of a new standard or the revision of an old one, to select one or more Sponsor Societies. The Sponsor Society or Societies will appoint a Sectional Committee to formulate or revise the standard. This Sectional Committee will report to the Sponsor when its work is completed. The Sponsor may then request the Association to approve. The Association deals only with the Sponsor and acts only at its request. Provision is made in all publications that a standard must be referred to as that of the Sponsor, using whatever title the Sponsor has given it, followed by the statement "approved by the American Engineering Standards Association." The approval may be given in one of three ways, as: Recommended Practice, Tentative Standard, or Standard, the expectation being that nothing will be approved as Standard until it has shown that it is generally acceptable.

Scope of the Association's Work

The Association thus acts only to bring together those interested in a common object, and when they have completed their work, will at their request, certify that it has been done in such a manner as to justify its adoption. Nothing revolutionary is proposed; it is merely an extension of present practice. The Executive Committee of the American Society for Testing Materials now passes on the composition of committees, ascertains that their conclusions are substantially unanimous, and if so, reports them to the society for acceptance or rejection. The Association does the same for groups of organizations. Its Board of Directors performs the same functions as the Executive Committee of the American Society for Testing Materials, and the Association as a whole accepts or rejects. It neither selects Sponsors nor Sectional Committees; it does not consider the subject matter of a standard, nor the procedure under which it is arrived at, except that it requires sufficient information from the Sponsor to show that the conclusions are substantially unanimous and that the Sectional Committee is balanced and representative. It requires that in all publications the Sponsor shall be given full credit.

In addition to this work in assisting in the selection of committees and certifying that their work

has been done under proper conditions, the Association will act as a bureau of information regarding standardization. It will collect information regarding existing standards and as to the bodies that have formulated and adopted them. This will enable it to promptly give necessary information to those who select a committee to formulate a new standard or revise an old one. It will also enable it to furnish information desired by the working committees regarding what has been or is being done on similar or related lines. It will establish relations with similar bodies in other countries and can do much to promote the acceptance of International Standards. It is possible to secure international acceptance of American Standards more easily through such a body than in any other way.

The Need for the Organization

With these fundamental restrictions of its activities it may be asked whether there is sufficient reason for the existence of the Association. This naturally has been carefully considered and it is the unanimous conclusion of the committee and of all of those who have been consulted who have been active in standardization work, that such an organization is urgently needed. The American Engineering Standards Association will furnish a means by which any organization intending to define a standard can readily ascertain what others are interested, and should be consulted in regard to it. At present there is no such means. There is nowhere anything approaching a complete list of the organizations doing standardization work, much less any list of the standards purposed or in preparation. The enormous advantage of having any standard generally accepted, and the much greater probability of accomplishing this if it is prepared under definite conditions that have proved effective in the past, will, it is believed, cause most of the organizations engaged in such work to ask and receive the assistance of the American Engineering Standards Association. It provides definite machinery for securing cooperation and preventing duplication of work. It establishes definite rules securing the absolute autonomy of any group engaged in the development of standards and insures that this group shall receive full credit for its work.

With the assurances of cooperation that the American Engineering Standards Association has already received, it is believed that there is no question of the advisability of forming the more broadly representative Association.

NEW CABLE TO JAPAN

A plan to lay another cable between Japan and the United States is making headway.

The Japanese government and influential business men, who are expected to finance the undertaking, are giving the project warm support.

The increase of words handled on the Pacific cable during the past few years shows a yearly proportionate increase of about 35 per cent. In 1918 about 5,000,000 words were carried.

Making a Success of an Electrical Store

BY HUGH W. KIMBALL

(What makes for success in retailing? Some principles which are the result of practical experience are here set forth, including a discussion of the relative merits of goods with large discounts which leave the advertising to the dealer, and nationally advertised goods. The importance of store location, store arrangement and the checking up of expenses is also dealt with. The paper was presented at the recent Santa Cruz Convention of Contractor-Dealers. The author is proprietor of the Kimball Electric Company of Oakland, California.—The Editor.)

Electrical retailers must all realize that they are promoting a business which though similar to other industries, is in itself in the position of an infant industry when its size and scope are taken into consideration.

Importance of Store Location —

I consider the most important factor pertaining to an electrical retailer is store location, and I would have no hesitancy in making a lease that might involve five or six thousand dollars a year for proper location. Electrical retailing is here. The public are interested, and we have just as good right to take the best locations and operate them successfully, as any other retail industry in that respect.

In studying this problem I have done considerable investigation and have talked with retail merchants of various lines. I find that the general opinion is that four per cent of the gross volume of business is not in any respect an excessive rent to pay for the proper location, and until such time as we realize the fact of the importance of location, we shall not become an active necessary adjunct to the distribution of electrical retail supplies. We find that household supply stores, hardware stores, furniture houses and department stores are reaping a large volume of this business and in reality are real competitors. Store location is the reason.

Advertising —

The second factor of electrical retailing in importance is advertising, and in conjunction with proper location, advertising must be done. The amount of money that might be spent in this respect

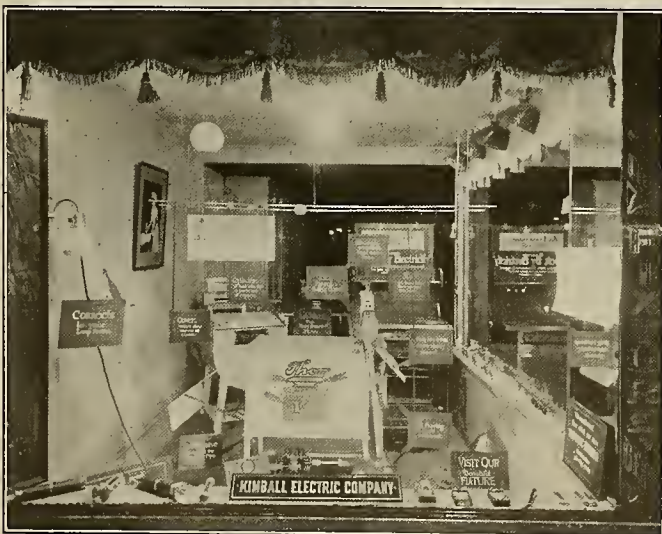
varies according to the product being sold, of course, but after considerable observation I am satisfied that an electrical retail store is entitled to spend an amount equivalent to four per cent of its gross sales for advertising purposes.

A great deal has been said by our manufacturers' agents and jobbers in regard to national advertising. I feel that the intricate details in the management necessarily surrounding a manufactur-



SELLING THROUGH STORE ARRANGEMENT

The display of electric ware in the store should always be such as to make such apparatus appear simple of operation, not to mystify. Lamps should be sold well back in the store, to bring customers past other displays and, if they purchase nothing further, to make them at home in the store. The farthest counter, in Mr. Kimball's effective store arrangement here shown, is the one where lamps are sold.



FOLLOWING UP NEWSPAPER ADVERTISING

By a newspaper advertising campaign on washing machines, backed up by active window displays, sales of this product were practically trebled in a two weeks period over the fourteen days just preceding the sale. Note that mazda lamps are always featured in the window, although not in a way to detract from the main display.

er's business (this also applies just as truly to jobbers) are in no respect suited to the successful conduct of retail merchandising. A manufacturer selling to the consumer is too much like government control or ownership of public utilities. It tends to eliminate a large class of alert, resourceful and energetic salesmen and thus kills the strongest selling force—that of constant personal contact with the public.

National or Local? —

National or general advertising is admitted to be a necessary adjunct to the marketing of a product, but in proportion as it eliminates the retail dealer it becomes of less selling value, and consequently less a part of this great service to the public that we hear so much about. I wish to substantiate this statement which I have just made by examples of products which my firm is handling. We are fortunate in having the exclusive sales right on a very fine electric cleaner. The manufacturers of this product do no advertising, local or national, and the only advertising service we have from them consists of stereotypic folders, which they send us free of charge

for mailing purposes. Their discounts, however, for handling their product are larger than in any other line which we handle, with the result that we are in a position to spend more money advertising this product directly to the consumer than we are with any other line we carry. It is more to our advantage to advertise our own company and this product than it would be if they spent ten times the amount we spend, in national advertising. We sell this product because it is recommended by those who are already using it, and we find it far easier to sell on the recommendation of satisfied customers, coupled with our own local advertising, than to sell those products which are extensively advertised in such magazines as the Saturday Evening Post, Collier's and others.

Eliminating the expense of national advertising, the manufacturer of this product is in a position to give us better discounts and we in turn are in a position to render better service by local advertising that nets more to us than products handled under national advertising done by the manufacturer.

What Advertising Will Do —

After varied experiences we have found that newspaper advertising has better direct results than any other form, and therefore it is profitable to do more in newspaper advertising than it might be in any general schemes upon which we might determine. We keep our appliance sales, that is, the sale of washing machines and vacuum cleaners, separate from general store sales. Earlier in this year we determined to make an extensive drive on the sale of washing machines. This drive started on February 15th of this year. From February 1st to February 15th we did not do any advertising in the newspapers and very little display work in the store. Our sales for the first fifteen days of February amounted to \$1,314.55. From February 15th to February 28th, inclusive, we spent in newspaper advertising \$429.40 and kept an active display of washing machines in operation in a laundry in one of our large windows at an expense of approximately \$75.00 for the one-half month. With this advertising we increased our sales from the figure just given to that of \$3,648.24 for the last twelve days of the month, or approximately three times as much as we did the first fifteen days of the month.

The distribution of folders supplied by the manufacturer, not only given over the counter but through the mail with statements and correspondence, has a splendid return.

Store Arrangement —

If you have the proper location, backed by proper advertising, the next most important factor, and one that must be seriously considered, is store arrangement. I am a strong advocate of active electrical displays, because they not only attract the eye of the public but show the simplicity of electrical operations. In the past it has been the tendency of the public to be afraid of electrical apparatus; there is something about it they do not understand. We have made a mistake in the past of having displays of electrical equipment which are a puzzle to those who view them. We should guard ourselves against investing the actions of this wonderful element with

mystery, because in reality it is simplicity itself, and the easier it becomes for the user to understand its action, the more it will be used.

Mazda Lamps and General Sales —

I want to mention at this time that the greatest call upon the electrical retailer is for Mazda lamps. We have found it profitable always to keep a well arranged display of Mazda lamps in our window. When we first equipped our present store, for convenience' sake we placed our lamp counter just inside the main entrance, and we found that the greatest number of customers who came into our store came for the purpose of buying Mazda lamps. They would come to this counter, obtain the lamps and leave without really getting into the rest of the store. Recently at considerable expense we placed this counter at the extreme rear end of the store, making it necessary for customers coming in for lamps to pass through the displays of our other departments. They really got into our store, and the result has proven to us that it was well worth the expense. I would advise that all retail dealers have their lamps as far inside their store as possible, as there are more customers calling for lamps than for all other purchases put together.

Handling Time Payments —

It was with considerable trepidation that we entered into the sale of vacuum cleaners and washing machines on the long time payment plan—that is, ten per cent down and ten per cent per month. I felt that we were facing a plan of collections which in itself was serious; but after a year's experience, I am in a position to state that the collections, properly handled, are very simple.

Our contract forms for the sale of this product specify that the payments are to be made at the office of the company, giving the street address. Our salesmen call the customer's particular attention to the fact that we do not send out a collector. We have found that after the second payment has been made on time all other payments are very apt to be made. If not, we sent out a notice that their payment is due at our office at a given date. We absolutely refuse to accept money on any contracts made outside of our own establishment. If for any purpose, the manager of this department or his assistants call upon a customer who is in arrears, they are absolutely forbidden to accept money on account. But the only time we call on customers for collection purposes is when we call to take away the product which they have leased.

The coming of these customers to our store for the purpose of making their payments is a big asset. It gives our sales people and the manager of our retail department an opportunity to get in touch with them, which often results in the sale of other products. We have a buzzer in the cashier's office specially for the purpose of calling the store manager when people come to make their payments.

Analysis of Business —

In analyzing overhead against the gross profit we have found in the past that the sale of retail materials generally in the store, not including the

sale of vacuum cleaners and washing machines, bears an overhead of 24%, whereas our average gross profit is 30%, leaving only 6% net profit, which is considered insufficient. Most retail merchants expect to get 15% net on their sales. This stock bears an average turnover of six times per year, including the sale of Mazda lamps which, of course, as far as the retail merchant is concerned, in reality has no turnover, as it is consigned stock. On the other hand, such an item as art portables bears a turnover of not less than one and a half times annually.

In our store we have found that the sales expense pertaining to vacuum cleaners and washing machines is higher than that of any other retail business. Our sales expense for the year of 1918 amounted to 32½%, divided approximately as follows:—

Sales expense	16%
Advertising	4%
Rent	2%
Contingent fund	1%
Office expense (allowed)	2%
Electric appliance maintenance	2%
Delivery	1½%
General administrative	4%
Total.....	32½%

The largest item on the list is that of sales expense based on what a good outside salesman will cost and what he should produce. We have found

that our best salesmen dispose of approximately \$1000 in merchandise per month. Such a man will not work for less than \$150 to \$200 per month. Our actual commission paid on aggregate sales amounted in 1918 to 16%, and as you can see, a man selling \$1000 worth of goods per month would receive an income of \$160, which is none too much.

Since the first of January, 1919, we have been able to reduce this expense in various places to approximately 30%, on account of increased volume; but even with a business of \$75,000, which we expect to do in this department this year, we cannot see how this expense can be further reduced. With the popular discount of 25% on such articles it is really impossible for a retail merchant to make money, and unless he can find a better discount he would be handling such business at a loss.

Analysis of turnover, overhead, and investment should not end with a general analysis. The stock should be segregated as far as possible and individual analysis made on specific lines. For example, our actual turnover on washing machines and vacuum cleaners stock is very high—I should say twenty-four times a year—whereas on the smaller socket devices, due to the necessity of carrying a large display, our turnover averages approximately four times per year.

Standardized Accounting System

(The recent endorsement of the Bureau of Education and Research of the National Electrical Contractors and Dealers' Association by the representatives of manufacturers, jobbers and central stations, means that the organization's work of bettering contractor-dealer business methods will be carried to a wider field. The standardized system of accounting which is here briefed from the report of the N. E. C. D. Association deserves general adoption by all engaged in the electrical business. The Journal of Electricity hopes at an early date to offer a series of articles which will aid in the adapting of these principles to simple business concerns.—The Editor.)

Every contractor and dealer intending to follow the system of accounting adopted by the National Electrical Contractors and Dealers' Association should familiarize himself with the six cardinal principles of accounting as laid down by the Accounting Committee of the Association of Electrical Manufacturers' Council (National Electrical Manufacturers' Association) and the Electrical Supply Jobbers' Association. These are as follows:

1. All forms should be standardized.
2. All sales, whether contract, jobbing, day work, or retail, should be costed.
3. A merchandising account should be created through debit entries for purchases and credit entries at cost for materials sold in any way.
4. A general ledger containing all controlling accounts should be made a part of this system.
5. All liabilities should be vouchered each month irrespective of receipt of goods or correctness of invoice. Provision should be made for charging vendors for any errors or discrepancies in bills.
6. Cash book should combine bank records, both receipts and payments, that debit entries equalizing bank deposits for the month and credit entries equalizing charges to bank balance. The cash book should not be used for distribution.

Necessary Steps in Starting the System —

Present books should be closed, the same as at the end of any fiscal year, and a trial balance obtained, including physical inventory of merchandise, tools, and office appliance, on hand.

The respective items in the trial balance should then be transferred to the proper accounts designated in the new trial

balance sheet furnished, and corresponding accounts opened in the new general ledger in the same sequence as the various accounts appear in the trial balance book.

Care should be exercised in changing former divisions of asset and liability accounts, also expense account, so that they will agree with the divisions outlined in these instructions, as it is essential that all members have the same viewpoint in the classification of assets and liabilities and those affecting the operation of their business.

Forms and Directions —

Only eighteen forms are necessary to the operation of this uniform accounting system. They are named in the key chart. These records, it is believed, provide a simple, accurate, and flexible accounting system for the average electrical contractor-dealer. The contractor and the contractor-dealer will use all of the forms, but the dealer who does a retail business exclusively will not need the first five forms. Central stations electric shops that are organized on a departmental and profit-making basis, as they should be, will also be able to adapt this system to their needs. The value of a uniform accounting system to the retail trade will, of course, be most largely conserved if those who install the system hold down the variations from it to the smallest possible number.

Form 1—Requisition of Material —

When an order for contracting work has been received from a customer naturally one of the first forms to be made out is a requisition for material. This form is necessary whether the shipment is from stock or from the vendor direct to the job. The form provides for this notation. However,

it must be remembered it is an office form and not a purchase requisition. At the same time that a job is opened with this form, the job envelope (No. 4) should also be opened. The requisition for material should be costed each day and filed in the envelope. If it is necessary to keep a separate stock record, a duplicate will serve this purpose, permitting the original to go into the job envelope. Where material is shipped direct from vendor to job, duplicate or order sent to vendor should be placed in job envelope and costed to take the place of Form 1.

Form 2—Time Card —

The time card is to be made out by the workman and turned in by him each day. The card should be filed under the workman's name so that all his cards are already assembled when computing his pay for the week. Before his card is filed, however, a separate card should be made out for each job listed on the workman's card. These cards are then to be filed in their respective job envelopes. The workman may not know the job number, but he certainly knows the name and address. The office or bookkeeper can then fill in the job number.

Form 3—Returned Material Record —

Whenever any material is returned from a job a returned material record is to be made out, listing the quantity and kind of material returned. The workman, or whoever checks the returning material, can fill in all of the form excepting the cost column. The form is then turned over to the bookkeeper, who will cost the material and then file the card in the proper job envelope.

Form 4—Job Envelope —

The job envelope is intended to contain all of the records of material, labor, and direct job expense after costing. As the job progresses all of the information should be entered on this form printed on the front of the envelope. The sum of material total, labor total, and expense total will give the actual total direct cost of the job. To this figure there must be added, of course, a percentage for overhead, and a percentage for profit when billing the customer. The information as to material, labor and direct job expense should be transferred to the duplicate of the customer's bill. The envelope should be filed numerically in the job envelope file.

Form 5—Material Summary Sheet —

The Material Sheet Summary is intended to supply a long-felt need in the electrical contractor's accounting. Its pur-

pose is to assist the contractor in assembling various types of material shipped, especially on day work, that is "time" and "material" jobs, so that a condensed billing can be made quickly and accurately on completion of the work.

With this form it is necessary to write down the name of an article only once (unless there are more than five requisitions of it) and against it can be indicated the date, the amount of material issued, the total issued, any return, the total chargeable, the unit cost, the total cost and the selling price.

The final figure on material on each requisition is to be entered in the column of the same name on the job envelope. This summary sheet is to be filled in progressively, that is, whenever material goes out on a job.

Form 6—Charge Sales Ticket —

No one form has been designed in this system for a charge sales ticket. This ticket will vary according to the use of a cash register, duplicating sales register, or sales book. Whatever kind of ticket is used, provision should be made for obtaining cost on this type of sale.

Form 7—Cash Sales Ticket —

No one form of cash sales ticket is recommended. Explanation and instruction for charge sales ticket holds good for this one, too.

Form 8—Bill to Customer —

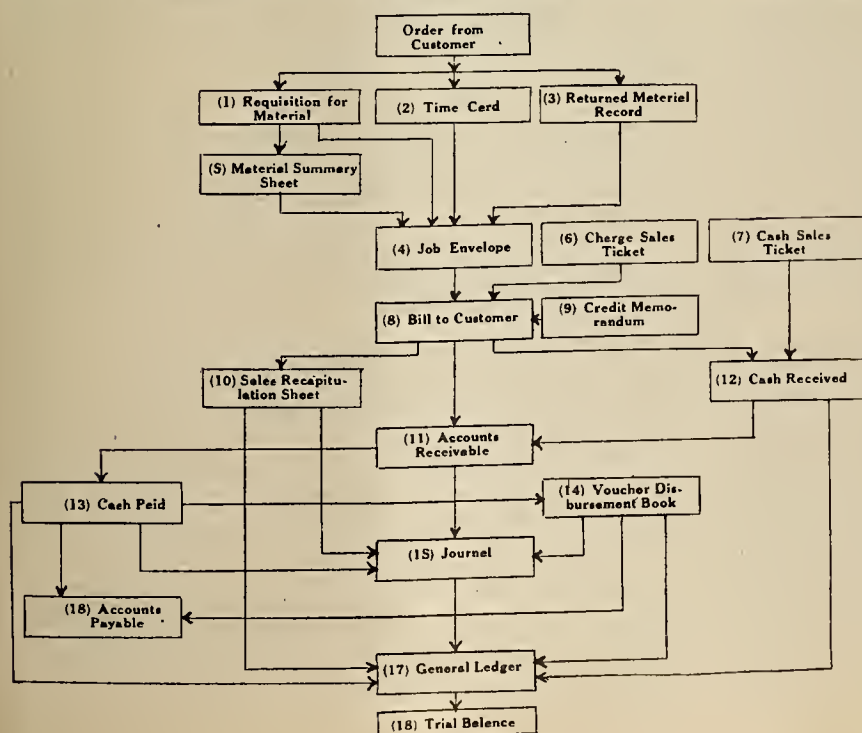
No one form of bill is recommended. All bills should be made in duplicate. Use plain paper for the duplicate. The bill and duplicate will carry the job number and also a consecutive bill number. The duplicate is to be filed according to the consecutive number in a standard binder, from which postings are made direct to the sales ledger, that is "Accounts Receivable." The number on the duplicate is to be used as the folio number in the sales ledger column.

Form 9—Credit Memorandum —

No one form of credit memorandum is recommended. Forms in duplicate should be provided for sending credit memoranda to customers, covering any allowances or adjustments. The duplicates are to be retained in a designated binder. The cost, as to material, labor and direct job expense of such credits is to be duly recorded in the duplicate.

Form 10—Sales Recapitulation Sheet —

Progressively during the month the amounts of bills rendered, together with the cost, should be entered on the



This chart shows the slips, cards, envelope tickets, bills, sheets and loose leaf pages used in the accounting system. For convenience all these records are called forms. The names of all the forms are given and the number in each panel refers to the description of the actual form as given in the text. The lines connecting the forms indicate the sequence of the accounting operations or the way in which business flows through the accounts in the system.

sales recapitulation sheet, which is a recapitulation of amount of sales (i. e., contract sales, and time and material sales), amount of lamp sales, amount of store sales, and the cost of these sales. At the end of the month the form will furnish the total sales with cost separated as to material, labor and direct job expense. These respective totals will be used in closing journal entries monthly, as explained later under "Closing the Books for the Month."

Form 11—Accounts Receivable—

The Accounts Receivable sheet is a simple form of sales ledger page, with debit, credit and balance columns, but if the particular business of any contractor necessitates a different form of sales ledger sheet, such a sheet, of course, can be substituted.

Form 12—Cash Received—

Enter all receipts from customers' payments in "Accounts Receivable" column, and discount deducted under "Cash Discount Allowed."

All receipts other than those affecting "Accounts Receivable" are to be entered in the column headed "General Ledger" and posted direct to the credit of the respective accounts in the general ledger.

Cash sales in total are to be recorded daily in the column provided.

In the columns marked "Bank" should be entered all deposits made in the banks. These deposits should equal the total receipts for the day.

Form 13—Cash Paid—

All payments, of whatever nature, are to be entered in column marked "Accounts Payable" and the discount obtained under "Discount Earned." Columns are provided under "Bank" in which should be entered all payments at net amount, on the same lines as the entry to "Accounts Payable," so that at the end of each month the total payments, less discounts, should equal the totals of withdrawals from the banks. All checks should be entered in the "Accounts Payable" column for the gross amounts of invoices. Discount is entered in "Discount Earned" column, and the net amount of the check in "Bank" column.

The sheet is placed in the same binder as the "Cash Received" sheet. On both "Cash Received" and "Cash Paid" sheets provision is made for two bank accounts, and on the latter sheet are columns for balances.

Form 14—Voucher Disbursement Book—

All indebtedness of whatever nature, whether merchandise, labor, direct job expense or overhead, should be assembled under the name of the vendor in the Voucher Disbursement Book, totaled and posted once each month when bills become due on a discount basis, to the credit of such vendor's account in "Accounts Payable" column. These bills are to be provided with consecutive voucher numbers, which are to be recorded in the column provided.

In order to obtain an analysis of the entries made under "Accounts Payable" column and to provide the proper debit entries, enter on the same line as recorded in "Accounts Payable" column the distribution of the amount credited to the vendor.

Columns from "Merchandise" to "Miscellaneous" are to be totaled at the end of the month and posted to the debit side of the account of the same name in the general ledger. Disbursements to "General Ledger" columns are to be posted to the debit of the respective accounts in the general ledger. The entries to "Accounts Payable" column are to be posted to the credit of the respective accounts in the Accounts Payable ledger.

For all overhead charges columned in this form, separate accounts should be opened in the general ledger for those omitted.

Debit distribution of all vouchers for which specific columns are not provided should be entered in "General Ledger"

column and posted directly. There are a great many entries, such as rent, insurance, and other expenditures incurred so infrequently that it is not necessary to provide disbursing columns in this book, and these are to be entered in the "General Ledger" column as the items are vouchered to accounts payable.

It is recommended that a Petty Cash account be kept, to be started on the following basis:

Draw voucher and give to bookkeeper sufficient amount to take care of small cash expenditures for express and expense items for fifteen days. As the bookkeeper or cashier wishes to replenish the cash on hand, voucher the receipts held for expenditures in voucher disbursement book to credit of Accounts Payable—"Petty Cash Account"—and debit to respective expense columns in same book.

Check is then drawn to order of Petty Cash, and to cover such voucher and money turned over to the bookkeeper. Receipts from Cash sales or other sources must be deposited in bank and not confused with Petty Cash money.

Form 15—Journal—

The Journal is to be used for all transfers from debit to credit of any accounts receivable and accounts payable, or general ledger.

Certain closing entries at the end of each month are also to be made through the Journal, as explained later in "Closing the Books for the Month."

Individual items entered during the month under either debit or credit of the respective column should be posted directly to the various accounts in each book with the exception of the "Merchandise" column (both debit and credit) which can be totaled at the end of the month and posted in one entry to "Merchandise" account.

Form 16—Accounts Payable—

Credit entries are obtainable from "Accounts Payable" column in the voucher disbursement book, and debit entries from the "Accounts Payable" column in the cash book. This is a loose leaf form.

Form 17—General Ledger—

The general ledger provided is a bound book, with debit, credit, and balance columns.

Full instructions for opening of the accounts and entries have been given above.

Form 18—Trial Balance—

When starting the new system a trial balance should be obtained, and at the end of the month totals are copied from the general ledger, the accounts corresponding to those listed in the trial-balance book, in which printed spaces are provided.

Closing Books for the Month—

Closing the books for the month involves the Sales Recapitulation Sheet, the Cash Book, the Voucher Disbursement Book, the Journal, the General Ledger, and the Trial Balance Sheet, as well as the Summary of Operations.

When the columns of the first five have been totaled and posted to their various accounts, accounts in the general ledger should be balanced, and entered in the proper place in the balance sheet.

The trial balance sheet covers Assets, Liabilities and Accounts under Summary of Operations.

The balances from "General Ledger" accounts should be transferred to the respective accounts as listed in the trial balance sheet and under Summary of Operations.

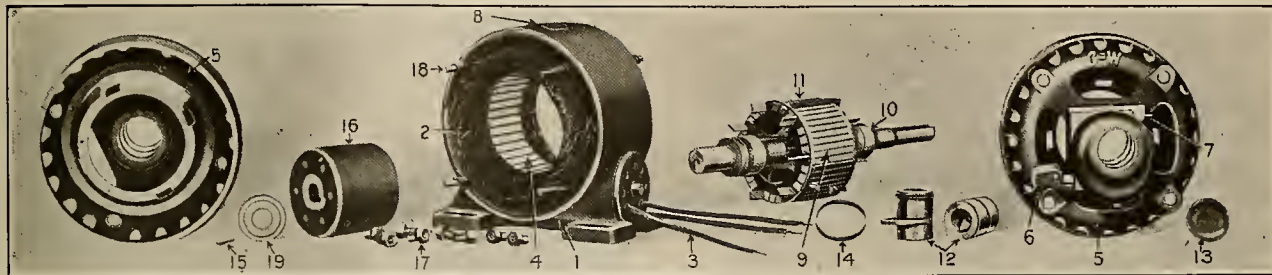
The accounts are all designated in the trial balance sheet as debit or credit as an aid to the proper analysis of these accounts.

The trial balance sheet should prove, of course, as to debits and credits, and a separate statement then should be prepared covering Assets and Liabilities and Summary of Financial Operations, both for the current month and the cumulative period of the year.

PRACTICAL LESSONS IN ELECTRICITY

BY H. H. BLISS

(The man who sells as well as the man who uses electric motors will have the hows and whys of their construction and operation made clear by the following exposition. This is the tenth of a series of articles especially designed to meet the needs of the man who desires more intelligently to deal with the various types of electric apparatus. Supplemental material is furnished by the Extension Divisions of the Universities of California and Oregon, in cooperation with whom this course is run.—The Editor.)



Note the simplicity of this small induction motor. Part 4 is the stator with windings shown at 2 inserted in slots on the inner face. Part 9 is the rotor of the "squirrel cage" type with simple copper bars for inductors

ELECTRIC MOTORS

Theory of Motor Action.—Oersted in 1819, laid the foundation of the modern electric motor when he discovered that current in a wire affected a nearby compass needle. He showed that the electricity tends to cause the movement of a magnet pole in a circle around the conductor. In Fig. 1, for instance, the current in wire A exerts a force upon the nearby north pole, trying to make it move upward, then to the right, then downward. A south pole would tend to circle the wire in the opposite direction.

Direct current motors are built with stationary poles, so that the wires themselves are made to

vicinity of any pole. In Fig. 2 it flows "out" (toward the observer) beside the north pole as indicated by the dots (arrow points); it flows "in" (into the paper) beside the south pole as shown by the (+) marks (arrow feathers).

If an armature such as that in Fig. 1 is supplied with an alternating current which reverses exactly "in step" with the rotation, so that current flows "in" along the other wire when that is beside the north pole, the machine will run and carry a load. This is the principle of the "synchronous motor."

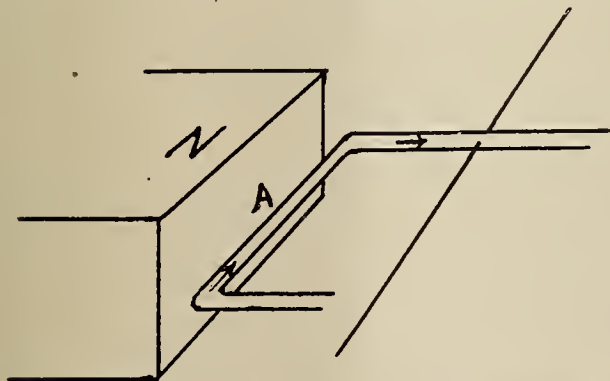


Fig. 1.—Current in Wire A tends to force the north pole upward. The reaction drives the wire itself downward.

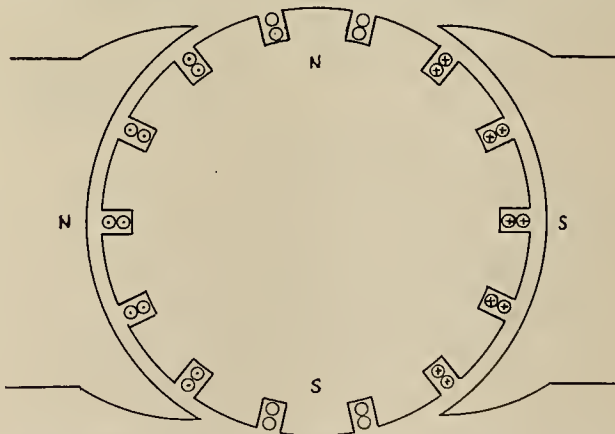


Fig. 2.—A motor armature. The currents in the wires may be thought of as producing poles in the armature iron which are attracted and repelled by the field poles.

move, just as a man trying to push a piano across a room may drive himself backward. Then in Fig. 1, wire A moves downward and the wire adjacent to a south pole moves upward. One can always determine the direction by remembering the old **Right Hand Rule**: Grasp the wire with the thumb pointing along it in the direction of current flow; then a north pole will follow the fingers around the wire.

The armature of a motor is built of laminated iron with slots for the conductors. (See Fig. 2.) The commutator of a d.c. machine acts to keep the current always flowing in the same direction in the

It follows that any electric generator will operate as a motor if supplied with current under proper conditions.

Another way to study the action of a motor is to think of the armature as an electromagnet. The coils in Fig. 2 tend to produce a north pole at the top of the armature and a south pole below. These are pulled and pushed by the field magnets according to the rule: Unlike poles attract and like poles repel each other. As the armature rotates, its poles continually shift through the metal and keep in their positions at the top and bottom, because the wires

at the right are always carrying current in while those at the left carry it out.

Counter Electromotive Force.—In a rotating motor armature the wires are passing at high speed through lines of force. This must set up a voltage in these wires, whether they carry current or not, for an e.m.f. is always induced in a conductor being cut by lines of force. This voltage may either help or hinder the current flow; if it helps, there will be more current and more magnetic force the faster the armature goes, which is contrary to reason and experience. We conclude that the induced e.m.f. opposes the current and the voltage driving it, and name it "counter e.m.f." or "back e.m.f."

The number of amperes through the armature depends, then, upon three things: the armature resistance, the applied voltage, and the back e.m.f. If we had a battery circuit of 2 ohms total resistance with 6 dry cells in series, the voltage would be $6 \times 1.5 = 9$ volts, and the current 4.5 amperes. If one of the cells were connected backward, however, the effective voltage would be $7.5 - 1.5$ or 6 volts, and the current 3 amperes. With two cells connected backward we should obtain 1.5 amperes. If three

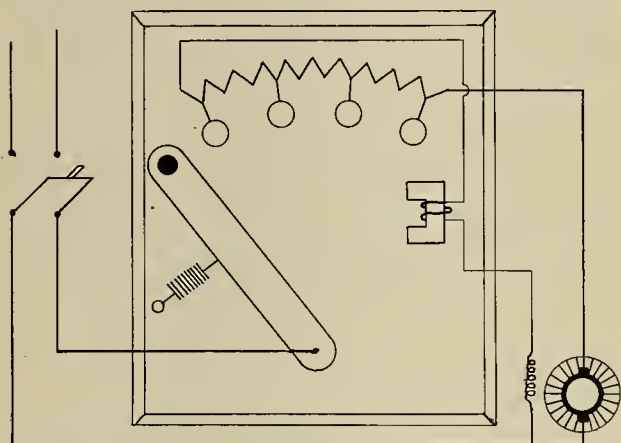


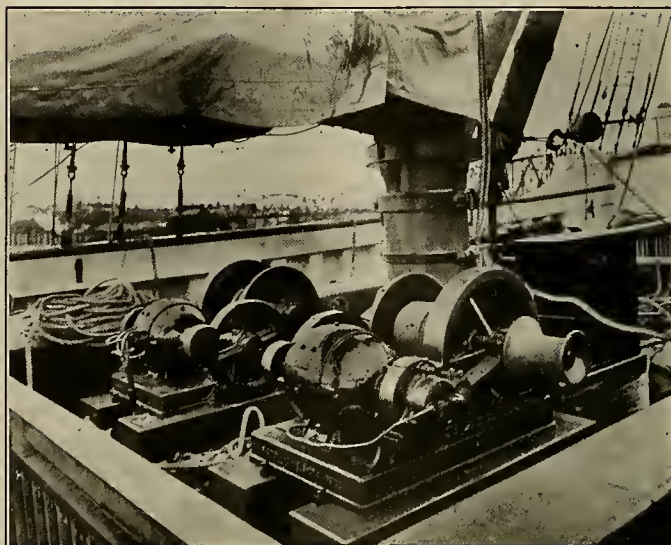
Fig. 3.—Starting box for a d.c. shunt motor. To protect the armature winding, when it is producing little or no back electromotive force, the line current is sent through a series resistance which is decreased as the motor speeds up.

cells were opposing the rest there would be no current, for the net voltage would be zero.

If the counter voltage of a motor equaled the applied pressure, no current could flow, and no power would be drawn from the line. Hence the back e.m.f. is always less than the applied voltage, for it takes power to run a motor, even when unloaded. The armature current = (applied volts — back e.m.f.) ÷ armature ohms.

Motor Starting.—When an armature is stationary it cannot produce any counter e.m.f. If the full voltage were applied a very heavy current would flow, and for the protection of the windings it is customary to provide some sort of starting apparatus which limits the current to a safe value. Direct current shunt motors (which are wound the same as shunt generators) are started with a variable resistance in series with the armature, as shown in Fig. 3. By means of a sliding contact the resistance is lowered step by step as the motor gains speed, and it is all out when full speed is nearly reached.

Alternating current motors are often started by applying pressure less than the normal line voltage. "Compensators" which are "step down transformers" are connected to the line and supply current at low voltage during the starting period. In other cases resistance is introduced into some of the motor circuits, while sometimes the connections of the coils are changed temporarily to produce effects equivalent to changing from parallel to series circuits.



Direct current motors of 15 hp. each drive these deck winches. What is the current input to one of the 116-volt motors when a load of 25000 lbs. is being hoisted 3 ft. per sec. if the overall efficiency of the machinery is 55%?

Alternating Current Motors.—Synchronous motors are used when it is desired to operate machinery at a speed exactly proportional to that of the generators supplying the current.

For driving the d.c. generators for electric railways and in other applications requiring large amounts of power it is usual to install synchronous motors in preference to other types, largely on account of their beneficial effect on the power factor of the transmission line.

Since they can not carry a load except when exactly in step with the alternations of the current supply, it is necessary to bring them up to speed by some special device. Sometimes the d.c. generator is connected to the direct current line and run as a motor during the starting period; in other installations the synchronous motor is started without load by means of a small a.c. motor of another kind.

For all ordinary applications, the "induction motor" is most widely used. The construction is simple, cheap and rugged, and operation and maintenance are easy and inexpensive. The typical motor of this type has no sliding contacts and only the simplest elements of a winding upon the revolving part or "rotor."

Alternating currents in coils wound about portions of the iron "stator" (stationary part) of an induction motor produce magnetic poles which are north when the current flows one way and south when it reverses. Other poles of opposite polarity are produced between these by coils wound in the opposite direction. The result is that north poles appear at several points around the stator and shortly

after (when the current has reversed) they appear in different places. By the use of two or more alternating currents which reverse at different times there is produced a smooth progression of the poles around the inside of the stator, and this is known as the "revolving field."

Just as in the alternating generator, the wires near the poles of a revolving field are cut by the moving lines of force and have e.m.f. induced in them. Thus the conductors of the rotor, which are short circuited upon each other, carry heavy induced currents, but no electrical contact with the supply

circuit is needed. The reaction between these induced currents and the magnet poles of the stator causes the rotor to turn. As it gains speed it almost catches up with the revolving field but it never runs quite as fast. If it did, there would be no more induction of e.m.f. on the rotor, for each wire would keep beside some pole and there could be no cutting of the inductors by lines of force. The difference between the speeds of the rotor and the revolving field is known as the "slip," and this varies whenever the load is changed.

General Lighting Safety Orders

(After several public hearings the Industrial Accident Commission has issued its General Lighting Safety Orders under the Workmen's Compensation Insurance and Safety Act. The principles of industrial lighting and the Safety Orders, extracts from which are reprinted below, were compiled by a committee of experts representing various interests, and will be adopted by the Commission, with a few minor alterations, at an early date.—The Editor.)

PRINCIPLES OF GOOD LIGHTING

Advantages of good light.—While the necessity of good natural and artificial light is so evident that a list of its effects may seem commonplace, these same effects are of such great importance in their relation to factory and mill management, that they are well worth careful attention. The effects of good light, both natural and artificial, and of bright and cheerful interior surroundings, include the following items:

1. Reduction of accidents.
2. Greater accuracy in workmanship.
3. Increased production for the same labor cost.
4. Less eyestrain.
5. Promote better working and living conditions.
6. Greater contentment of the workmen.
7. More order and neatness in the plant.
8. Supervision of the men made easier.

In this list it will be noted that items 4, 5, 6, 7 and 8 all have a bearing on accident prevention.

In view of the fact that resulting advantages of superior illumination on increased output are apt greatly to exceed economies in operation cost as regards the lighting system, it is a distinct advantage to direct and hold the attention on the former rather than on the latter.

While it is desirable to have adequate light over the working areas, it is absolutely essential for the proper results to eliminate or minimize the light which otherwise would pass directly from the lamps to the eyes of the workers; that is, one must avoid glare which is not only fatiguing to the eye but also conducive to the incorrect estimation of sizes and locations of objects in the field of view.

A. Daylight

Adequate daylight facilities through large window areas, together with light, cheerful surroundings, are highly desirable and necessary features in every work place, and they should be supplied through the necessary channels not only from the humane standpoint, but also from the point of view of maximum plant efficiency. The following requirements may be listed for natural lighting:

1. The light should be adequate for each employee.

2. The windows should be so spaced and located that daylight conditions are fairly uniform over the working area.

3. The intensities of daylight should be such that artificial light will be required only during those portions of the day when it would naturally be considered necessary.

4. The windows should provide a quality of daylight which will avoid a glare due to the sun's rays and light from the sky shining directly into the eye, or where this does not prove to be the case at all parts of the day, window shades or other means should be available to make this end possible.

5. Ceilings and upper portions of walls should be maintained a light color to increase the effectiveness of the lighting facilities from window areas. The lower portions of walls should be somewhat darker in tone to render the lighting restful to the eye. Factory green or other medium colors may be used to good effect.

In all the work of providing natural light, it should be kept in mind that direct sunshine in itself, from the illumination standpoint, but irrespective of sanitary conditions, is not wanted. The idea that sunshine is the important item is a common but an erroneous impression.

B. Artificial Light

It is evident that the introduction of the many new lamps has made possible what may be termed a new era in industrial illumination, a distinctive feature of which is the scientific installation of the lighting units, suiting each to the location and class of work for which it is best adapted.

The general requirements for artificial lighting are as follows:

1. Sufficient illumination should usually be provided for each workman irrespective of his position on the floor space.

2. The lamps should be installed and selected so as to avoid eyestrain to the workmen.

3. The lamps should be operated from sources of supply which will insure reliable illumination results, particularly on account of the demoralizing effect by intermittent service, just when the light may be most needed.

4. Adequate illumination should be provided from overhead lamps so that sharp shadows may be prevented as much as possible, and in such measure that individual lamps close to the work may be unnecessary except in special cases.

5. The type and size of lamp should be adapted to the particular ceiling height and class of work in question.

6. In addition to the illumination provided by overhead lamps, individual lamps should be placed close to the work if they are absolutely necessary in the eyes of a lighting expert, and in such cases the lamps should be provided with suitable opaque reflectors.

LIGHTING SAFETY ORDERS

(a) Windows, skylights or other roof-lighting construction of buildings shall be arranged with the glass area so apportioned that the darkest part of any working space, when normal exterior daylight conditions obtain (sky brightness of 1.50 candle-power per square inch) there will be available a minimum intensity equal to twice that of Order 1503, otherwise artificial light of intensities specified in Order 1503 shall be provided.

(b) Awnings, shades, diffusive or refractive window glass shall be used for the purpose of improving daylight conditions or for the avoidance of eyestrain wherever the location of the work is such that the worker must face large window areas through which excessively bright light may at times enter the building.

Note.—The intensity requirements for adequate day lighting are much higher than those for adequate night lighting, because in general under daylight conditions the light reaching the eye from all surroundings in the field of vision is much brighter than at night, and hence a correspondingly more intense light must fall on the object viewed.

Order 1503. Artificial Light —

(a) When the natural light is less than twice the minimum permissible intensities of illumination set forth in the following table, artificial light shall be supplied and maintained in accordance with the table.

Foot-candles at the floor level	
1. Roadways and yard thoroughfares.....	0.02
2. Storage spaces, stairs, stairways, halls, hallways,, passageways, aisles, exits and elevator entrances	0.25
3. Water-closet compartments, toilet rooms, wash-rooms, dressing rooms and elevator cars.....	0.50
Foot-candles at the work	
4. Work not requiring discrimination of detail, such as handling material of a coarse nature, and performing operations not requiring close visual application	0.50
5. Rough manufacturing requiring discrimination of detail, such as rough machining, rough assembling, rough bench work, also work in basements of mercantile establishments requiring discrimination of detail	1.00
6. Rough manufacturing requiring closer discrimination of detail, such as machining, assembly and bench work, also work in basements of mercantile establishments requiring closer discrimination of detail, intermediate between 5 and 7	2.00
7. Fine manufacturing, such as fine lathe work, pattern and tool making, also office work, such as accounting and typewriting.....	3.00
8. Special cases of fine work, such as watchmaking, engraving and drafting.....	5.00
9. Processes otherwise safeguarded in which light is detrimental	0.00

Order 1505. Shading of Lamps for Overhead Lighting —

(a) Lamps suspended at elevations above eye-level less than one-quarter their distance from any positions at which work is performed, or where places are traversed, must be shaded in such a manner that the intensity of the brightest one-quarter square inch of visible light source shall not exceed seventy-five candle power per square inch.

Lamps suspended at elevations greater than twenty feet above the floor are not subject to this requirement.

Order 1506. Shading of Lamps for Local Lighting

(a) Lamps for local lighting must be shaded in such a manner that the intensity of the brightest

square inch presented to view from any position at which work is performed, shall not exceed three candle power.

Note.—In the case of lamps used for local lighting, at or near eye level, the limits of permissible brightness are much lower than for lamps used for overhead lighting, because the eyes are more sensitive to strong light received from below, and because such light sources are more constantly in the field of view.

Order 1508. Emergency Lighting —

(a) Emergency lights shall be provided in all work-space aisles, stairways, passageways, exits, outside landings of fire escapes and other structures, used as regular or emergency means of egress. These emergency lights are to provide for adequate illumination when, through accident or other cause, the regular lighting is extinguished.

Note.—It is the intention of this Order to guard against accident due to the failure of the regular lighting system, by providing sufficient illumination to enable the occupants to: avoid contact with moving machinery and other danger points until the regular lighting is again placed in operation, and to vacate the building safely and expeditiously when this is necessary because of fire or other causes.

(b) Emergency lighting systems, including all supply and branch lines, their runways, raceways and supports, shall be entirely independent of the regular lighting system, and shall be lighted concurrently with the regular lighting system and remain lighted throughout the period of the day during which artificial light is required or used.

(c) Emergency lighting shall have a minimum intensity of one-fourth ($\frac{1}{4}$) foot-candle. The emergency illumination shall not exceed fifty (50) per cent of the distributed illumination.

(d) Emergency lighting systems shall be supplied from a source independent of the regular lighting system in theatres, public meeting halls, moving picture exhibition places, hospitals, schools, and any other place where the nature of the hazard is such as to require it, except where the hazard is granted by the Industrial Accident Commission. This source of supply and controlling equipment shall be such as to insure the reliable operation of the emergency lighting system when, through accident or other cause, the regular lighting system is extinguished. Where a separate source of supply can not be obtained for the emergency lighting, the feed for emergency lighting must be taken from a point on the street side of the service equipment. Where source of supply for the regular lighting system is an isolated plant within the premises, an auxiliary lighting system of sufficient capacity to supply all emergency lighting must be installed from some other source, or suitable storage battery; or separate generating unit may be considered the equivalent of such service.

Order 1509. Switching and Control Apparatus —

(a) Switches or other controlling apparatus shall be so installed that pilot or night lights may be controlled from a point at the main entrance, and/or other easily accessible points. Pilot or night lights may be a part of the emergency lighting system.

(b) All switching and control apparatus on emergency, pilot and night lights shall be plainly labeled for identification.

The Business Library

BY LOUISE B. KRAUSE

(You know how to use your engineering tools: do you know how to use your books — how to find the information you want? The librarian of H. M. Bylesby & Company of Chicago discusses here the place of reference books in the business library. The second part of the article will appear in our next issue. Attention is called to the necessity for written permission to reprint from this series.—The Editor.)

REFERENCE BOOKS FOR THE BUSINESS LIBRARY

All business organizations, whether they employ a librarian or not, have need of some reference books for general information as well as for special information along the lines of their individual work. If a librarian is not employed the reference books are not so valuable as they might be, because there is generally no one at hand so skilled in manipulating their indexes and contents, that the exact information required is immediately forthcoming; for it is in the field of reference books particularly that the business librarian acts as "Open Sesame" to the business man. The ability to find information is a matter of training; it does not suffice merely to possess books or to be told of existing resources. This truth was stated in a homely fashion some time ago by a practical engineering journal, which said:

"Books are just as much engineering tools as wrenches, hammers, or cold chisels, and it takes practice to successfully manipulate them. We have all probably laughed at the novice's first attempt to use a monkey wrench,—a man can be just as clumsy with the books that he consults to assist him in solving his problems. Just as it took considerable time to acquire skill in handling tools about the plant, it also takes a lot of time to acquire the knack of getting information out of books," or to state the case in the words of the founder of the famous Poole index system, "The facile proficiency in the use of books does not come by intuition."

It is the purpose of this article and the one to follow, to make some practical comments on the best reference books for business libraries, from which each individual business library can make a selection according to its special needs.

The list aims to include only such reference books as have been found to be of actual use, and to exclude all references to books which although excellent in their lines, have no place in the work of the business library, and no further apology will be made for their omission.

Bibliographies

No attempt is made to describe bibliographically the books listed. This has been well done for most

of them in Kroeger's Guide to the Study of Reference Books, third edition, published by the American Library Association, 78 East Washington street, Chicago, 1917, price \$2.50. The few business men who have time to give to the detailed study of reference books will find this guide an authoritative treatise on the subject, and on file at the Public Library. Another useful aid in the selection of books for business libraries, both reference books and books on general business subjects, is entitled "1600 Business Books," compiled by Sarah B. Ball, second edition, issued by the H. W. Wilson Company, New York City, 1917, price \$1.50. This volume is very useful in showing what literature is in print on various business subjects, but as the entries are not annotated it is not a guide to the relative value of the books listed, but titles recommended for first purchase are starred under the subject entry. The publishers have announced that a new edition of this work is in preparation which will be annotated, and which will make it of much more value than it is in the present form.

Two excellent lists of worth while books on business subjects are "A Select List of Books for Business Libraries," by Paul H. Nystrom in National Efficiency Quarterly, May, 1918, and "A White List of Business Books," by John Cotton Dana, printed serially in "The Nation's Business," November, 1917, to date.

Selecting Reference Books

In selecting reference books for a business library it is wise to keep in mind the following facts. It does not necessarily follow that because a book is printed on a subject it is therefore worth while purchasing. Examine and test the credentials for worthiness of every reference book carefully. Even the best reference books fall down at some point and must be used with judgment. No matter how excellent a reference book appears to be in its accuracy and completeness, remember it is of no value to the business library unless that library has particular use for it. It is almost as serious a fault in a business library to have more books than are

A Reference Book is a book which is to be consulted for definite points of information rather than read through, and is arranged with explicit references to ease in finding specific facts.

—E. C. Richardson

needed as it is to have too few books to meet the needs. A good purchasing rule to follow, is to buy only after it has been clearly demonstrated that the library has no book which will give certain information desired, for it has been found that a few well selected reference books will answer a multitude of questions, and some of the business libraries doing the best work have comparatively few working tools of this class. It must be remembered also that it is not sufficient to buy a copy of an annual publication once, but that the latest edition must be purchased each year in order that the information may be kept strictly up to date.

Dictionaries

The first and foremost reference book which a business office needs is an English dictionary, for the men who dictate and the stenographers who write reports and letters must have an authoritative source to which they can turn for definitions, spelling, synonyms, hyphenation and pronunciation.

The two best single volume dictionaries, costing about twelve dollars each, are the latest editions of the **Standard Dictionary**, published by Funk and Wagnalls, and **Webster's New International Dictionary**, published by Merriam. Of these two dictionaries the preference of many scholars is for Webster, although the Standard is considered most excellent on present day words and their meanings. One of the drawbacks in using Webster hurriedly is the divided page. In the upper part of the page the main words of the language are given, and in the lower part in smaller type are given the minor words, foreign phrases and abbreviations.

In an office which prepares a great deal of advertising material, or "copy" for publication, a thesaurus dictionary will be very useful. **March's Thesaurus Dictionary of the English Language**, Philadelphia Historical Publishing Company, "designed to suggest immediately any desired word to express exactly a given idea; a dictionary of synonyms, antonyms, idioms, foreign phrases, pronunciation, a copious correlation of words," may be purchased for \$15.00, if an elaborate dictionary of this kind is to be desired. **Roget's Thesaurus of English Words and Phrases** may be purchased in several editions, prices \$1.25 up to \$2.00.

The business library will do well to provide a few books on business English, pronunciation, capitalization, abbreviations and correspondence forms, a few of which are the following:

- Vizetelly **Desk Book of Errors in English**, New York, Funk & Wagnalls, \$1.00.
- Putnam's **Correspondence Handbook**, New York, Putnam, \$1.75.
- Lewis **Business English**, Chicago, LaSalle Extension University, \$1.40.
- Manley & Powell **Manual for Writers**, University of Chicago Press, \$1.25.
- University of Chicago **Manual of Style**, University of Chicago Press, \$1.50.
- United States Public Printer **Style Book**, a compilation of rules governing executive, congressional and departmental printing, Washington, Superintendent of Documents, \$0.15.

If a business library finds it needs any foreign language dictionaries, possibly French and Spanish, bilingual ones can be obtained in one volume editions

from any first class book dealer at a cost of not more than \$3.00 a volume.

The Encyclopedia

The new edition of the **Century Dictionary and Cyclopedia** is a luxury for a business organization and need not be considered in this list, but the business library must have a general encyclopedia, and the best one for the American business office is without doubt the **New International Encyclopedia**, published by Dodd, Mead and Company in 23 volumes, latest edition 1916. Price bound in library buckram, \$6.00 per volume.

Its advantages for business use over the new edition of the much recently advertised **Encyclopaedia Britannica**, are that the point of view of the articles covers American needs better, that all information is alphabetized under the most specific subject word, so that no index volume has to be consulted as is the case in using the Britannica, and that there are ample "see" references, if the subject looked up is entered under a different terminology.

In regard to its authority, comprehensiveness, illustrations, maps and bibliographical references at the end of the articles, the New International ranks in the first class of encyclopedia productions. It can be purchased printed on the much exploited India paper if the saving of shelf space means more to the business office than does the rapid turning of leaves. The India paper leaves are apt to stick together and also crumple easily. The most desirable binding is library buckram rather than flexible leather, which some business libraries have been unwise enough to purchase. Dodd, Mead and Company also issue an excellent annual encyclopedia entitled the **New International Year Book**, as a supplement to the New International Encyclopedia, which brings the Encyclopedia down to date at a cost of \$5.00 per volume.

The **World Almanac and Encyclopedia**, published for the New York World both in cloth and paper binding at 50 and 25 cents per volume, is an invaluable addition to the business library, no matter how well supplied it may be with pretentious encyclopedias. It is strong on statistics of all kinds which are brought down to date and contains a wide range of miscellaneous information which cannot be found readily in more expensive handbooks. It has an excellent index and is generally the best book to consult in a hurry in answering the many miscellaneous questions which arise in a business office. It has been estimated that it will answer 25% of the questions which come up in every day business experience.

Lippincott's New Gazetteer of the World, a geographical dictionary, Philadelphia, Lippincott, 1906, price \$10.00, is useful but much out of date in its statistics.

Are you interested in new generating stations? power house construction? the automatic substation? there will be something you want to know in the Power issue of the Journal of Electricity. It comes out on September 1st. Don't miss it.



California Electrical Co-operative Campaign

(The success of the California Electrical Cooperative Campaign is attested by all who have come in touch with its work. The following statement by the general agent of the Southern California Edison Company is a high tribute based on a conservative estimate of results achieved. The paper was read recently before the San Francisco Electrical Development League by Lee H. Newbert, Chairman of the Advisory Committee of the Cooperative Campaign.—The Editor.)

THE CALIFORNIA ELECTRICAL COOPERATIVE CAMPAIGN FROM THE VIEWPOINT OF THE CENTRAL STATION

BY S. M. KENNEDY

From the viewpoint of the central station, the work of the California Electrical Cooperative Campaign is progressing satisfactorily, and further plans now under way indicate conditions of a still more satisfactory character during the present year.

Campaign Aims —

The Campaign is being conducted along broad, liberal and progressive lines with ideals and aims of a high order. While the total volume of sales of labor-saving apparatus may not be as large today as it was before the central station curtailed its direct selling efforts, yet it is becoming more and more apparent that the cooperative plan as applied to sales work bids fair to produce an organization which will eclipse in efficiency, service and actual results anything that has gone before.

The central stations, in a recent convention at Coronado, again went on record as being solidly back of the Campaign. Under the supervision of the Advisory Committee, a condition is rapidly being brought about which gives better service to the public and incidentally more profit to those engaged in the electrical industry.

Improved Relations —

Nor is this all. Formerly when the central station was "paddling its own canoe," some contractor-dealers did not feel that their interests and those of the central station were mutual, but sometimes thought they had to fight the central station in order to hold their own. Although in constant contact with the public and in an excellent position to assist in smoothing out misunderstandings and to implant confidence in the minds of the central station's consumers, they did not always feel any incentive to do so.

Happily, this condition is practically a thing of the past, and the contractor-dealer is now learning to use his strategic position to foster better relations between the central station and the public.

Better Merchandising —

Simultaneously with these things, a further transformation is occurring, which is very gratifying to the central station. The personnel of the contractor-dealer is toning up and he is qualifying to occupy a much larger place in the business world than has heretofore been accorded him. Stores are better kept; sales methods are improving; a better account-

ing system is being adopted; credits are more stable; enthusiasm is awakening; opportunities are increasing; and while responsibilities are growing, satisfactory results are keeping pace.

Cooperative Advertising —

Practically all central stations in the state are contributing liberally of advertising space on broad and comprehensive lines. The encouraging quickness with which the various branches of the industry are tying-in in this educational campaign, cannot fail to result in a greater public interest in electrical goods than has heretofore been achieved by the sporadic advertising of the different branches. The pulling together of all branches of the industry in this advertising work has had a marked influence upon newspaper publishers, many of whom have awakened to the fact that something big is going on in the electrical industry.

The Contractor-Dealer's Part —

It must not be overlooked that one of the principal objects of the whole plan of the Campaign is to educate the contractor-dealer and make him a more aggressive, practical and progressive business man than he has generally been heretofore. The California Electrical Cooperative Campaign, or any other nation-wide campaign, cannot be considered successful unless the contractor-dealer is brought to realize the importance of all the work that is being cheerfully done to help him and is willing and anxious to take full advantage of the assistance that is being offered and given him. Cooperation is not a one-sided affair, and the contractor-dealer must do his share in the cooperative plan and qualify himself as a graduated student in merchandising, so that he may be able to take up the commercial work which he asks the central station to lay down and carry it on with credit and profit to himself and continuing satisfaction to the central station.

It is therefore obvious that the California Electrical Cooperative Campaign, as now conducted, will work out to the mutual advantage of all parties, if the contractor-dealer will take advantage of his present opportunity and make good. Will he do this? The Central Station believes that he will.

An exceptional program has been arranged for the Annual Convention of the Northwest Electric Light and Power Association, to be held in Seattle September 10th to 13th. An outline of the program will appear in our next issue.

SPARKS—Current Facts, Figures and Fancy

(Plans for a gold pool as well as helpful hints for hasty advertising agents are contributed by South America to this collection of odd items from everywhere. A Norwegian device for radio-telegraphy, the steel industry in Japan and Wales, a German message shell, a new street-conveyance in Paris, and generalities about foreigners will maintain the cosmopolitan tone which is appropriate for our foreign issue.—The Editor.)

War is quite a strain on the nation's pocket book: this one has cost the United States \$30,205,000,000 up to June, 1919.

* * *

United States imports from Europe are decreasing: for the fiscal year ending June, 1919, they are estimated at \$300,000,000 as compared with \$900,000,000 in the three years preceding the war.

* * *

In Wales more than a hundred years ago there lived an old blacksmith who could weld steel so perfectly that the join was invisible and the temper of the steel absolutely unimpaired. But he refused to divulge his trade secret and it died with him.

* * *

Anyone who has been envying American officers their pleasant and exclusive mode of traveling in motorcycle side-cars had better go to Paris. Five hundred side-cars are to be licensed there like taxicabs, and will be for hire at about 20 cents a mile.

* * *

Japan is developing her steel industry to such an extent that it is predicted she may be able to sell her steel even on the British market within another ten or fifteen years. Discoveries of ore in Korea, and ore concessions in China are said to be the chief sources of the increased raw material.

* * *

A young British scientist has developed a set of instruments by means of which a message is conveyed over a ray of light. The sender speaks into a transmitter which sends out intermittent flashes of reflected light. A lens at the receiving end catches the light rays, which are then translated into speech through a telephone receiver by the action of selenium cells.

* * *

To do away with the expense and risk of shipping gold to pay for purchases between the United States and South America, a gold pool has been inaugurated. Settlements will be made periodically, and a standard coin, to be called the "panamerican," is proposed. The value of the "panamerican" would be about 20 cents.

* * *

At a power plant recently the water rose so high that it was spilling over the dam and flowing into the plant through the doors and windows. The situation was saved by the farmers of the neighborhood who turned out at midnight and manned the pumps for forty-eight hours until the water in the generating room could be lowered by other means.

A substitute for platinum in electrical apparatus has been the object of some private investigations. An alloy of 90 per cent gold and 10 per cent copper was found to be a satisfactory substitute for cathodes. After being electrically coated with a thin layer of platinum and then carefully polished and burnished, the same alloy was found suitable as an anode.

* * *

A message shell designed and used by Germany during the war is an object of interest in allied military circles. It is made for use in either a trench mortar or a 77 field piece; when it strikes a small explosion breaks open an outer chamber and ignites a powder with a colored glare and a thick smoke, equally conspicuous by night or day. The shell can then be opened and the message removed.

* * *

A new device for radio telegraphy has recently been patented by a Norwegian engineer. The current is received by an accumulator which releases it at regular intervals. The clearness of sound is dependent upon the regularity of the current, and by this system it is released with mathematical exactness. In addition to producing clearer sounds the device is considerably cheaper and simpler than those now in use.

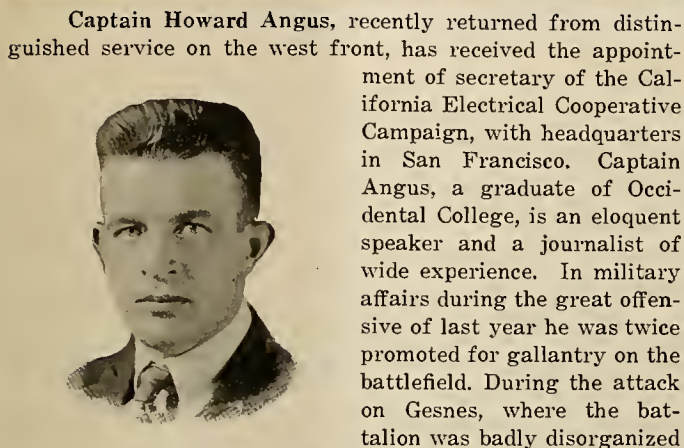
* * *

"Grasping the unseen" is extremely simple if you have the right kind of mind. It is recorded that a certain advertising agent in South America conceived the brilliant notion of registering the names of incoming ship arrivals as his "prospects." The strange part about it is the fact that nobody objected for a long time, and in the event of the new arrival becoming an advertiser the far-sighted agent was permitted to claim the commission.

* * *

An unknown lady who evidently loved her country not wisely but too well once remarked in our hearing that if she had her way "every blessed foreigner should be turned out of the United States." The following statistics are for her especial enlightenment: There are some 15,000,000 foreign-born people in the United States. Among these, according to figures compiled in 1910, are 44,802 shoemakers, 43,322 butchers, 13,725 candy store owners, 65,117 grocers, 14,530 fruit store owners, 7,877 shoe store owners, 17,582 restaurant owners, 54,431 barbers, 15,108 hotel keepers—and thousands of others engaged in innumerable perfectly respectable businesses and professions.

PERSONALS



Captain Howard Angus, recently returned from distinguished service on the west front, has received the appointment of secretary of the California Electrical Cooperative Campaign, with headquarters in San Francisco. Captain Angus, a graduate of Occidental College, is an eloquent speaker and a journalist of wide experience. In military affairs during the great offensive of last year he was twice promoted for gallantry on the battlefield. During the attack on Gesnes, where the battalion was badly disorganized by heavy losses, Captain Angus on his own initiative gathered together the scattered elements of the command, bringing them forward and reinforcing the line under the most trying circumstances. At the signing of the Armistice his company held the record of being the most far advanced of any in action. During the recent campaign in the southern district of California to purchase the Edison distributing system Captain Angus had full charge of publicity that won the election for the city. It is believed the brilliant past accomplishments of Captain Angus, both in civil and military life, augur well for magnificent results ahead for the California Cooperative Campaign which has already accomplished such splendid work.

Dr. A. C. Crehore, the well known physicist who is a joint author of Bedell & Crehore's book on "Alternating Currents" which has attained wide use in the technical colleges and universities of the country, is now residing in Denver, Colorado.

R. Timmerman, formerly division manager for the Utah Power & Light Company at Bingham, Utah, has returned from approximately two years' service as a Lieutenant in the Navy, and will have charge of the Provo Division of the same company, succeeding A. P. Merrill, transferred to the Ogden Division.

A. A. Tacchella, Pacific Coast representative of the Busch-Sulzer Brothers Diesel Engine Company, has recently opened temporary offices in the Hotel Manx, San Francisco. Max Rotter, chief engineer of the company, with headquarters at St. Louis, is a San Francisco visitor. The new offices will specialize on marine installations.

George Elery Hale, director of the Mount Wilson Observatory and Foreign Secretary of the National Academy of Sciences who has been for the last ten years a Correspondent of the Academie des Sciences, Institut de France, has received the unusual honor of election as Associe Etranger, taking the place of Adolph von Baeyer, which has been declared vacant. The Foreign Associates are limited to twelve, and the high distinction has been held by only two Americans.

Robert Sibley, editor of the Journal of Electricity, and Chas. H. Delany, steam power plant specialist for the Pacific Gas & Electric Company, who were the joint authors of an extended series of articles on fuel oil and steam engineering that appeared in the columns of the Journal of Electricity, have been advised by the American Library Association Publishing Board that their new book on "Elements of Fuel Oil and Steam Engineering" appears in The Booklist for June among the list of "Best New Books of American Authors."

Louis R. Ardouin has assumed his duties as executive secretary of the San Francisco Association of Electrical Contractors and Dealers. Mr. Ardouin, previous to a year's service as athletic instructor with the Y. M. C. A., was State Secretary of the Minnesota Electrical Contractors and Dealers' Association at Minneapolis. During 1916 and 1917 he was secretary of the Builders' Exchange of Duluth, Minn. He consequently brings to his new duties a wide experience and thorough understanding of association work.

L. H. Stratford is the new manager of the Pocatello Gas & Power Company, with headquarters at Pocatello, Ida., and E. D. McDonald, former manager of the company, has been proffered a position with the company controlling the local concern in Chicago, Ill. Mr. Stratford comes from Great Falls, Mont., where for two years he was engaged as assistant manager of the W. A. Baehr Company, owner of the local gas plant. Mr. Stratford is well known in this section, having held important positions with the Utah Power & Light Company at Ogden and with the Portland Gas & Coke Company at Portland, Ore.

R. H. Ballard, vice-president of the Southern California Edison Company and president of the National Electric Light Association, has been in San Francisco since his conference of a month ago and with John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, who is serving as chairman of the Public Policy Committee of the Association, has outlined a most constructive program for the year ahead. Mr. Ballard is at present pushing the Geographic Section idea for national adoption, which has so forcefully demonstrated its usefulness in the West. At his request a copy of the August 1st issue of the Journal of Electricity has been forwarded to over five hundred power plant managers of the United States, calling attention to the leading editorial of that issue, to his own message that appears in the issue, and particularly to the message of A. Emory Wishon, assistant general manager of the San Joaquin Light & Power Corporation and president of the Pacific Coast Section, N. E. L. A., entitled "Three and One-Half Years of Achievement," wherein accomplishments of the Pacific Coast Section, N. E. L. A., are most forcefully set forth.

Lieutenant William E. Hubbard, USNRF, has returned to San Francisco, after two and one quarter years of war

service in the United States Navy. Ten months of this time was spent on foreign service with the South Atlantic Squadron and the remaining period, on duty with the Bureau of Steam Engineering at Washington, D. C. While with the Bureau, Lieut. Hubbard originated and placed in operation a centralized controlling system for the maintenance of steam engineering material, a standardized dictionary of engi-



neering nomenclature, a material marking and identification system and developed and designed a new type of gas engine for small motor boat propulsion. In addition to these duties he had charge of the repairs to all motor boat machinery including the 110-foot Submarine Chasers, and the production of the Norfolk Gas Engines, manufactured at the Navy Yard, Norfolk, Va. Mr. Hubbard has opened offices in the Hobart Building, where he will conduct, under the name of the Hubbard Machine Company, the business interrupted by his entry into the Federal Service, April 6, 1917, specializing in deep well machinery, of which he holds several patents, and also continue practicing his profession of consulting engineer.

A. E. Chandler, president of the California Water Commission, has passed in his resignation to Governor Stephens, to take effect October 1, 1919. At that time Mr. Chandler will enter the law firm of Haven, Athearn, Hall and Chandler, forming thereby a group of men well known in legal affairs of the West. Mr. Chandler is at present president of the San Francisco Engineers' Club and is the author of "Elements of Western Water Law," a book that is used as the text on this important subject in many of

our universities and colleges. He is considered among engineers generally as one of our ablest interpreters of water law. His work for the state has been highly constructive, and this announcement of his retirement from the California Water Commission will deprive the present state administration of one of its ablest men. From all quarters of the West Mr. Chandler carries with him the sincerest of good wishes for success in his new activities, which will be largely concerned with water law and its interpretation.

E. H. Bell of San Francisco has recently joined the sales forces of the Electric Material Company.

W. T. Goddard, chief engineer of the Locke Insulator Company, Victor, N. Y., is among recent prominent visitors to San Francisco.

C. G. A. Baker, of the Baker-Joslyn Company, has returned to San Francisco from Los Angeles, and H. F. Hartzell is now at the company's Seattle offices.

Edward B. Snyder, sales agent of the high tension division of The Ohio Brass Company of Mansfield, Ohio, is a recent San Francisco visitor. Mr. Snyder is accompanied by A. O. Austin, chief engineer of the porcelain division of his company.

John Gregory, formerly assistant bank examiner for Nevada, and brother of S. B. Gregory, Pacific Coast manager of the Arrow Electric Company, has been made executive secretary for the Oakland (Cal.) Association of Electrical Contractors and Dealers.

Pio Venturini, electrical engineer for the Mining and Electric Company of the Arno Valley, Florence, Italy, is a Pacific Coast visitor. Mr. Venturini is inspecting many of the great hydroelectric companies of America and expects to return to Italy in November.

Ell C. Bennett of St. Louis, Mo., has resigned office as the seventeenth Mercury of the Joyian Order, to which post he was elected last October, to serve until January, 1920, to join the International Paint Corporation in the capacity of secretary and general manager.

Ralph B. Clapp, sales agent, has returned from France, where he has been serving as a secretary of the Y. M. C. A., and will resume his work as Southern California representative of the American Circular Loom Company, Stanley & Paterson, and the Electric Engineering Equipment Company.

Ira Francis, Pacific Coast manager of John Roebbling's Sons Company, has returned to his San Francisco office after a business trip to Trenton, N. J., and other eastern centers. Mr. Francis says he feels unusually grateful for the cool San Francisco fogs after the recent weather he passed through in eastern points.

J. E. Davidson, formerly vice-president and general manager of the Pacific Power and Light Company, and well known to the men of the electrical industry in the West, is retiring from office as president of the Nebraska Section of the National Electric Light Association, and will be succeeded by T. H. Fritts of Grand Island, Nebraska. Mr.

Davidson is at present with the Nebraska Water Power Company at Omaha.

Sven Hallsjo, an electrical engineer of Sweden who represents private and public cooperative effort in charge of electrical economic production in Sweden, is now visiting the West in order to study modern construction for transmission of energy for agricultural purposes. Mr. Hallsjo has recently spent some time in San Francisco and the San Joaquin valley.

J. C. Clark, associate professor of electrical engineering at Stanford University, has returned from an eastern trip of several weeks, during which time he attended the sessions of the Lake Placid Convention of the American Institute of Electrical Engineers. Professor Clark represented the San Francisco Section of the Institute, of which he has been the local chairman during the year just ended.

Capt. W. D. A. Peaslee, formerly consulting electrical engineer at Portland, Ore., and recently returned from France, has been made chief engineer for the Jeffery-Dewitt Insulator Company with headquarters at Huntington, West Virginia. In company with A. L. McLeod, general manager of the company, he has been visiting Pacific Coast points during the past two weeks. While in France Capt. Peaslee had varied and interesting experiences. Going over with the 537th Engineers, because of his knowledge of French he was assigned liaison and reconnaissance work with the French army, then became motor-transportation officer for the chief engineer of the First Army. After the Armistice was signed he was assigned to the peace commission as executive officer of the information and liaison department and later put on special duty at Sorbonne University, where he was granted the Diplome d'Etudes Supérieur.

H. E. Sanderson, Pacific Coast manager of the Bryant Electric Company with headquarters in San Francisco, has

returned from a short trip through the Sierras and reports that business and fishing are both good. The shadow in the foreground is that of W. M. Deming, president and general manager of the Journal of Electricity, who has also recently had a most enjoyable auto trip up in the high Sierras in company with Mr. Sanderson.

H. N. Sutherland of the General Electric Company, Schenectady, N. Y., is among recent visitors to this coast and has been spending some



time in San Francisco and the bay region.

OBITUARY

Chas. H. McGwire, assistant chief engineer of the Board of Public Utilities of Los Angeles, leaped to his death recently from the eleventh story of the Hall of Records building in Los Angeles. Mr. McGwire has during the past year served as local chairman of the Los Angeles Section of the American Society of Mechanical Engineers.

Oscar Otto, General Superintendent of the South Philadelphia Machine Works of the Westinghouse Electric & Manufacturing Company, died on June 30th from injuries received in an automobile accident. Prior to accepting a position as General Superintendent of the Westinghouse Machine Works at East Pittsburgh in 1909, Mr. Otto spent some years in the West with the Northern Pacific Railroad Company, of Tacoma, Wash. He was at the Westinghouse Company's new plant at Essington, Pa., from February 1918 until his death.

Meeting Notices for Electrical Men

(Organizations as a whole are still affected by the vacation period, especially in the coast region. Nebraska, however, sends in a report of a recent interesting electrical convention, while plans for the Foreign Trade Convention next year are already under way. The California Association of Electrical Contractors and Dealers has held important business meetings and made various changes in by-laws.—The Editor.)

California Association of Electrical Contractors and Dealers

The California Association of Electrical Contractors and Dealers announces that its new offices are at 645 New Call Building, 72 New Montgomery street, San Francisco.

The secretary of the Association calls the attention of members to Article VIII of the Constitution which reads as follows:

"Authorized Representatives—

"Every person, firm or corporation shall file with the Executive Secretary a statement authorizing an individual to act for them, this individual to be known as their representative. This representative shall cast vote of firm. His acts shall be deemed as the joint acts of the firm or corporation. No representative shall act for a shorter period than one year, unless change of representatives is approved by two-thirds vote of members present at any meeting."

The secretary requests that statements in accordance with this article be sent in for the files as soon as possible.

An important development is the new system of paying dues. For the information of those who were not there the By-Laws covering this are quoted:

"Article XI—

"Dues of each member shall be based upon the equivalent of the inspection fees paid by him to the Department of Electricity of the City and County of San Francisco for electrical wiring only. The record of this fee shall be obtained from the Department of Electricity of the City and County of San Francisco by the Executive Secretary. Minimum dues in all cases shall be Three Dollars (\$3.00) per month."

Members will be billed for these weekly or oftener until further notice, as circumstances dictate.

Another important step taken at a recent meeting was the inauguration of a new system of filing bids in the Association office for the protection of members. For the information of those who were not present, the following revised By-Laws, now in effect, are quoted:

"Filing of Duplicate Bids—

"Section 1. Whenever a member of this Association is called upon to figure or estimate on electrical work exceeding Five Hundred Dollars (\$500.00), he shall immediately communicate with the Executive Secretary, apprise him of the name of the job, location, names of owner, architect, or general contractor. Upon receipt of this information the Executive Secretary will request from the official receiver of the bids a definite time for the opening of the said bids. The Executive Secretary having ascertained this definite time, will communicate this information to all bidders and demand that a signed copy of the bid in question be filed in the office of the Executive Secretary, not later than one hour previous to the time of opening, in a sealed envelope furnished by the Executive Secretary for this purpose.

"Section 2. The bids so filed as aforesaid shall not be opened until one hour after the time set for the opening of bids by the official receiver thereof.

ARTICLE XIX

"Section 1. No member of this Association shall submit figures of any kind to anyone unless he is requested to do so, but this is not meant to prevent any member from soliciting an opportunity to submit bids.

"Article 2. No member of this Association shall submit electrical bids wherein the electrical work is combined with other lines of work, nor shall he accept contracts of such nature unless rejected.

"Section 3. On the original bid no substitutes nor alterations not included in the original plans and specifications as submitted to bidders shall be submitted or figures by any member of this Association.

"Section 4. When deductions, substitutions or alterations are made

in an electrical figure within the original plans and specifications as submitted to bidders, a member of this Association will file a copy of his bid covering these changes with the Executive Secretary in the same manner as the original bid, to which the duplicate bid will be attached."

Foreign Trade Convention

The preliminary arrangements for the seventh National Foreign Trade Convention, to be held in San Francisco May 12th to 15th, 1920, are being formulated at this time. Many new features will be inaugurated by way of reception and entertainment for the delegates of this world-wide convention, for such indeed will be the scope as indicated by arrangements recently completed. The Pacific Mail Steamship Company has promised to have a special steamer from Calcutta

to San Francisco and another from Valparaiso to San Francisco, stopping at the principal ports enroute to pick up delegates coming to the San Francisco convention.

The San Francisco Chamber of Commerce will have charge of the local arrangements for the seventh National Foreign Trade Convention under the general direction of the Pacific Coast Committee of the National Foreign Trade Council consisting of Frederick K. Koster, chairman, Robert Dollar and J. K. Armsby. These gentlemen are all Councillors of the National Trade Organization.

C. P. Converse, Pacific Coast Secretary of the National Foreign Trade Council, will have charge of the details of the plans of the local and national committee.

It is hoped to have a larger delegation in San Francisco in 1920 than attended Chicago in April of this year. It will be necessary

to have some 2,000 representatives in order to do this.

National Electric Light Association

The Overhead Systems Committee of the National Electric Light Association, formerly called the Overhead Lines Committee, desires through the Journal of Electricity to request the cooperation of all members and member companies in this year's work of the committee.

The committee plans to bring up to date the descriptions, specifications and other matter previously published relating to overhead line construction. Information will be compiled regarding recent experience and new practices, with especial attention to any innovations and other features developed during the war period.

To make this work complete, the committee needs active assistance, and it would be much appreciated if members will communicate freely with the committee furnishing any information to suggest any features which they think should be developed in the next report. Matter of this kind should be

BUILDERS OF THE WEST—LIV



CHARLES P. STEINMETZ

Knowledge of the exact mathematical laws that control the great modern servant of mankind—electricity—has proven the driving vision that has in large measure made possible the harnessing of water power in the wonderful mountain fastnesses of the West and its transmission over lofty mountain ranges and across thirsty deserts to the rich agricultural and industrial centers of the West to a degree equaled nowhere else in the world. To Charles P. Steinmetz, erecting engineer for the General Electric Company, this issue of the Journal of Electricity is affectionately dedicated, in appreciation of his masterly grasp of mathematical law and application in design of electrical apparatus.

presented in sufficient detail so that the committee can work to the best advantage in securing the desired information.

It is suggested at this time that the previous reports of the committee be reviewed by members in order to determine the character of the recommendations and information still required. If such attention is paid to the subject, the committee's activities will be guided by the real necessities of the industry and there will be a greater production of valuable constructive data, without repetition of information already available.

It is hoped the work of the committee will not only be facilitated by these contributions, but that members will avail themselves of this opportunity to make use of their committee by indicating the kind of assistance they desire.

Electrical Supply Jobbers' Association

On account of the scheduled arrival of the fleet in San Francisco bay, the next meeting of the Pacific Division of the Electrical Supply Jobbers' Association has been postponed until August 18, 19 and 20.

The gathering will take place at Del Monte, and it is expected that large numbers of electrical men from all parts of the Pacific Coast will be present. The program has not as yet been definitely announced.

California Electrical Cooperative Campaign

A meeting of the Advisory Committee of the California Electrical Cooperative Campaign has been called for 10 a.m. Thursday, August 21, 1919, at Hotel Del Monte, Del Monte, California.

Attention is called to the fact that this meeting comes at the conclusion of the Pacific Coast Electrical Supply Jobbers' Association, which meets on the 18th, 19th and 20th of August at Del Monte.

American Society of Heating and Ventilating Engineers

The American Society of Heating and Ventilating Engineers draws its membership from the ranks of ventilating and heating engineers and experts, and from among those engineers in other lines who have had particular experience in the field of ventilating and heating. The objects of the society are the promotion of the arts and sciences connected with heating and ventilating in all branches; the maintenance of a high professional standard among its members; the reading, discussion and publication of professional papers calcu-

lated to advance the science of heating and ventilation; and the interchange of experience among members.

The headquarters of the organization are at 29 West Thirty-ninth street, New York City.

Nebraska Electrical Association

An interesting convention of the Nebraska Electrical Association was held recently at Grand Island, Nebraska. The opening meeting was called to order by President J. E. Davidson, who gave his annual report of the activities of the Association and appointed the following members to the nominating committee: Conlee, Shaw, and Boyies. Mayor J. L. Cleary of Grand Island welcomed the delegates to the city in a very interesting talk.

The convention was addressed by C. H. Kelsey of Norfolk, Nebraska, Mr. Shaw of Lincoln and Mr. Conlee of Beatrice replying.

J. R. Smith gave a talk on "Selling Securities to the Public," which was instructive and very interesting, and Mr. Davidson and S. B. Harvey gave general talks on their experience in selling securities to their customers.

Chas. B. Scott of Chicago and Walter Byrne of Omaha read papers on "Safety Rules and Regulations" and "New Business Activities," respectively. General discussion followed.

A paper on "Modern Steam Plants," by H. A. Lynette of Chicago, and one on "Public Policy Activities," by F. E. Helvey, also aroused great interest.

A rising vote of thanks was extended to Mr. Scott and Mr. Lynette for their presence and the very interesting papers they prepared. A vote of thanks was also extended to the Central Power Company and their employes for the excellent entertainment that they provided for the delegates; to the jobbers present for their many courtesies extended to the Nebraska Electrical Association, and to the Grand Island Commercial Club for furnishing automobiles for the pleasure of the convention.

One of the interesting features of the event was an automobile trip to Boelus, Neb., to visit the hydro-plant of the Central Power Company.

The following officers were elected for the coming year: president, T. H. Fritts of Grand Island; first vice-president, J. B. Harvey, of Omaha; B. H. Conlee was appointed secretary by the president.

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

- National Officers**
 President—Calvert Townley, Westinghouse Electric & Manufacturing Company.
 Secretary—F. L. Hutchinson, Engineering Society Bldg., New York City.
 Meetings—Monthly.
- Los Angeles Section**
 Chairman—J. H. Cunningham, General Electric Co., Los Angeles.
 Secretary—Clem A. Copeland, Bureau of Power and Light, Los Angeles.
 Meetings—Second Tuesday of each month.
- Portland Section**
 Chairman—W. D. Scott, Pacific Telephone & Telegraph Company, Portland, Ore.
 Secretary—E. H. Le Tourneau, Portland Railway, Light & Power Company, Portland, Ore.
 Meetings—Monthly.
- Denver Section**
 Chairman—Prof. H. S. Evans, Univ. of Colorado, Boulder.
 Secretary—Robt. B. Bonney, Mountain States Tel. & Tel. Co., Denver, Colo.

Meetings—Third Saturday of each month, at the Shirley Hotel.

San Francisco Section

Chairman—W. G. Vincent, 445 Sutter St., San Francisco.
 Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
 Meetings—Fourth Friday each month—Engineers' Club, 7 p.m.

Seattle Section

Chairman—John Harisberger, 4015—4th Ave. N. E., Seattle, Wash.
 Secretary—T. C. Smith, City Lighting Department, Seattle, Wash.
 Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.

Spokane Section

Chairman—George Nixon, Main and Lincoln Sts., Spokane.
 Secretary—G. H. Hoppin, 1128 W. Kiernan Ave., Spokane.
 Meetings—Third Friday of each month.

Utah Section

Chairman—A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
 Secretary—H. T. Plumb, 183 U St., Salt Lake City, Utah.
 Meetings—Third Wednesday of alternate months, 8 o'clock. Assembly Room of Commercial Club, Salt Lake City.

Vancouver Section

Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
 Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch
 Chairman—A. E. McMahon, University of California, Berkeley, Cal.
 Secretary—D. D. Davis, University of California, Berkeley, Cal.

University of Colorado Branch

Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

Idaho University Branch

Meetings—First Wednesday evening of each month from October to June.

University of Washington Branch

Chairman—Jack Tolmie, Univ. of Washington, Seattle.

Secretary—Glen Walker, Univ. of Washington.

Meetings—Monthly, first Tuesday, Forestry Bldg.

Oregon Agricultural College Branch

Chairman—Lawrence Fudge, Oregon Agr. College, Corvallis, Ore.

Secretary—Otto L. Cantrall, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch**Montana State College Branch**

Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.

Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Throop College of Technology Branch

Chairman—Mark Sawyer, Throop Dormitory, Pasadena, Cal.

Secretary—Russell Otis, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch

Chairman—Clarence E. Guse, Pullman.

Secretary—Ralph C. Guse, State College of Washington, Pullman.

Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS**National Association of Electrical Contractors and Dealers**

Chairman—W. Creighton Peet.

Secretary—W. H. Morton, 110 West 40th St., New York.

Executive Committeemen, Pacific Division—J. R. Tomlinson, Portland, J. F. NePage, Seattle, Wash.

Electrical Contractors & Dealers of Salt Lake City

President—G. W. Forsberg.

Secretary—E. H. Eardley, Eardley Bros., Salt Lake City.

British Columbia Ass'n Electrical Contractors and Dealers

President—E. Brettell, Vancouver, B. C.

Secretary—Capt. W. J. Conway, Vancouver, B. C.

Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers

President—M. A. De Lew, 180 Jessie St., San Francisco.

Secretary—J. W. Redpath, Rialto Bldg., San Francisco.

Meetings—Monthly.

Denver Electrical Contractors' Association

President—E. C. Headrick.

Secretary—C. N. Shannon, 227 Coronado Bldg.

Meetings—2nd and 4th Monday nights of each month.

Electrical Contractors and Dealers Ass'n of San Francisco

President—C. L. Chamblin, 641 Mission St., San Francisco.

Secretary—Louis R. Ardouin, San Francisco.

Meetings—Friday, 12:30; New Call Bldg.

Southern California Electrical Contractors and Dealers

President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.

Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.

Meetings—Every Friday at 6:30 p.m. at the Pin Ton Cafe, 427 South Broadway.

Monterey Bay Electrical Contractors and Dealers

President—W. Cox, Santa Cruz.

Secretary—D. K. Noggle, Monterey.

Nevada Ass'n of Electrical Contractors and Dealers

President—F. V. McAvoy, 138 N. Canter St., Reno.

Secretary—R. W. Shearer, 215 Sierra St., Reno.

Meetings—Twice a month, 15th and 30th.

Oregon State Ass'n of Electrical Contractors and Dealers

President—R. C. Kenney, 388 Burnside street, Portland.

Secretary—J. Willis Oberender, 209-10 McKay Bldg., Portland, Ore.

Portland Local Ass'n of Electrical Contractors and Dealers

President—Roy C. Kenney, Portland.

Secretary—J. W. Oberender, 209-10 McKay Bldg., Portland.

Meetings—Alternate Mondays at Imperial Hotel Grill.

Sacramento Section, California Electrical Contractors & Dealers' Association

President—W. H. Gribble, Sacramento.

Secretary—H. Berg, Sacramento.

Washington Ass'n of Electrical Contractors and Dealers

President—V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.

Secretary—Forrest E. Smith, Seattle, Wash.

Meetings—Quarterly—second Thursdays of March, June, September and December.

JOBBER'S ASSOCIATIONS**Electrical Supply Jobbers Association**

General Secretary—Franklin Overbath, 411 So. Clinton St., Chicago, Ill.

Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers

President—T. E. Bibbins, 575 Mission St., San Francisco.

Secretary—Albert H. Elliot, 544 Market St., San Francisco.

Meetings—Quarterly.

Electrical Credit Ass'n of the Pacific Coast

President—J. H. Zweifel, Electrical Appliance Co., San Francisco.

Secretary—Albert H. Elliot, 544 Market St., San Francisco.

Meetings—annually; San Francisco; May.

OF ELECTRICAL INTEREST**California Electrical Cooperative Campaign**

Chairman Advisory Committee—L. H. Newbert, 445 Sutter St., San Francisco.

Secretary—Captain Howard Angus, New Call Bldg., San Francisco.

Colorado Electric Light, Power and Railway Association

President—E. A. Phinney, Jefferson Co. Power & Light Co.

Secretary-Treasurer—F. P. Safford, Denver Gas & Electric Co., Denver, Colo.

National Electric Light Association

President—R. H. Ballard, Southern California Edison Company.

Secretary—T. Comerford Martin, 29 West 39th St., New York.

Nebraska Section, N. E. L. A.

President—T. H. Fritts, Central Power Company, Grand Island, Neb.

Secretary-Treasurer—B. H. Conlee, Beatrice Gas & Electric Company, Beatrice, Neb.

Nevada Section, N. E. L. A.

Chairman—Geo. A. Campbell, Reno, Nev.

Pacific Coast Section, N. E. L. A.

President—A. E. Wishon, San Joaquin Light & Power Corporation, Fresno, Cal.

Secretary—A. H. Halloran, Journal of Electricity, Electric Bldg., San Francisco.

Meetings—Annually, in April.

Portland Section, N. E. L. A.

Chairman—F. H. Murphy, Portland Railway, Light & Power Company.

Secretary—Geo. Bowen, Portland, Ore.

Illuminating Engineering Society

President—S. E. Doane.

Secretary—Clarence L. Law.

Western Representatives—Romaine Myers, Bacon Bldg., Oakland, Cal.; C. M. Masson, Edison Bldg., Los Angeles; F. H. Murphy, Portland Railway Light & Power Company, Portland, Ore.; W. R. Putnam, Utah Power & Light Company, Salt Lake City; Fred A. Osborn, University of Washington, Seattle, Wash.

Meetings—First Tuesday each month.

New Mexico Electrical Association

President—D. W. Morgan, Las Cruces, N. M.

Secretary—Charles Twogood, Albuquerque, N.M.

Meetings—Annually, in February.

Southwestern Electrical and Gas Association

President—W. A. Sullivan, Shreveport, La.

Secretary—H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Northwest Electric Light and Power Ass'n

President—H. J. Gille, Puget Sound Traction Light & Power Co.

Secretary—W. E. Herring, Puget Sound Traction, Light & Power Co.

Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.

Los Angeles Jovian Electrical League

President—A. E. Peat, San Joaquin Light & Power Corp.

Secretary—Frank Weiss, Los Angeles Gas & Electric Corp.

Meetings—Every Wednesday, 12 m.

San Francisco Electrical Development League

President—Henry Bostwick, 445 Sutter St., San Francisco.

Secretary—J. W. Redpath, Rialto Bldg., San Francisco.

Meetings—Every Monday, 12:10 p.m.; luncheon, Palace Hotel.

Electric Metermen's Association

President—J. E. Bridges, Westinghouse Electric & Manufacturing Company.

Secretary—A. E. Coney, Great Western Power Company, San Francisco.

Meetings—About every 60 days.

Alameda County Electrical Club

President—George Drew, Pacific States Electric Company, Oakland, Cal.

Secretary—George B. Furniss, Pacific Gas & Electric Company, Oakland, Cal.

Synchronous Club

Secretary—H. N. Beecher, City Hall, Los Angeles.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section

President—W. H. Brommage, Pacific Tel. & Tel. Co., San Francisco.

Secretary—Chas. H. Dobson, 835 Howard St., San Francisco.

MECHANICAL ENGINEERS**National Officers**

President—Mortimer E. Cooley, Electrical Engineering Dept., Ann Arbor, Mich.

Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

San Francisco Section, A. S. M. E.

President—W. F. Durand, Stanford University, Palo Alto, Cal.

Secretary—Jas. A. Kinkead, Rialto Bldg., San Francisco.

Meetings—Quarterly.

Thursday lunches have been arranged at the Engineers' Club, 57 Post St.

Los Angeles Section, A. S. M. E.

President—Charles H. McGuire.

Secretary—T. J. Royer.

Meetings—Quarterly.

ENGINEERS' CLUBS**Oregon Society of Engineers**

President—John W. Cunningham, 414 Spalding Bldg., Portland.

Secretary—Orrin E. Stanley, Box 973, Portland.

Meetings—Annual: First Monday in February.

Monthly: Third Thursday of each month.

Third Thursday of each month.

The Engineers' Club of Seattle

President—H. E. Horrocks, Seattle, Wash.

Secretary—E. J. Bartells, Northern Life Bldg., Seattle, Wash.

Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco

President—A. E. Chandler, New Call Bldg., San Francisco.

Secretary—J. R. Brownell, Manufacturers' Indemnity Exchange, San Francisco.

Annual Meeting: October.

Idaho Society of Engineers

President—W. H. Gibson, Mountain Home, Idaho.

Secretary—Ira F. Shaffner, Boise, Idaho.

Engineers' Club of Oakland

President—R. S. Chew, Oakland Chamber of Commerce, Oakland.

Engineers' Club of Sacramento

President—George S. Nickerson, 914 Forum Bldg., Sacramento.

Secretary—P. M. Noebels, State Department of Engineering, Forum Bldg., Sacramento.

Colorado Engineering Council

President—Arthur Ridgway, 810 Equitable Bldg., Denver.

Secretary-Treasurer—Robert J. Grant, 614 Interstate Trust Bldg., Denver.

United Engineering Societies of San Francisco

Chairman—C. D. Marx, Stanford University.

Secretary—Nathan Bowers, Rialto Bldg., San Francisco.

Joint Committee Technical Societies of Los Angeles

Chairman, George A. Damon, San Fernando Bldg., Los Angeles.

Secretary—W. K. Barnard, 705-6 Central Bldg., Los Angeles.

Utah Society of Engineers

President—Leonard Cahoon.

Secretary—Wm. H. Kelsey.

Meetings—3rd Wednesdays except May, June, July and August.

Annual banquet—May.

MISCELLANEOUS**American Ass'n for the Advancement of Science—Pacific Division**

President—John Campbell Merriam, University of California; Acting Chairman National Council of Research.

Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.

Meetings—Annual.

Portland Section A. S. C. E.

President—P. H. Dater, Eng. U. S. Forestry Service.

Secretary—C. P. Keyser, Park Bureau, Portland, Oregon.

Meetings—At call of president.

Spokane Engineering & Technical Ass'n

President—L. K. Armstrong, A. S. M. E.

Secretary—A. D. Butler, City Engineer, Spokane, Wash.

Meetings—Third Friday of each month. Joint with A. S. C. E., A. I. E. E. and A. S. M. E.

Foreign Trade Club

President—W. H. Hammer, Monadnock Bldg.

Secretary—Wm. E. Hague, Monadnock Bldg.

Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.

Pacific Coast Gas Association

President—John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.

Secretary—Henry Bostwick, 445 Sutter St., San Francisco.

Society for Promotion of Engineering Education

Secretary—F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

HAPPENINGS IN THE INDUSTRY

AMENDMENTS TO THE COMPENSATION LAWS

On July 22, 1919, the amendments to the Workmen's Compensation, Insurance and Safety Act, as adopted by the last California Legislature, became effective. The Industrial Accident Commission has prepared a summary of these amendments. Approximately seventeen changes were made in the Act.

The waiting period was reduced from ten days to seven days. Compensation will be payable to the injured man on the eighth day after he leaves work as the result of an industrial injury.

When an employe under sixteen years of age is injured, it shall be the presumption that such injury was not caused by serious and wilful misconduct.

Serious and wilful misconduct cannot be charged against the injured employe by the employer if the injury is caused by the failure of the employer to comply with any provision of law or any safety order of the commission with reference to the safety of places of employment.

In claims of serious and wilful misconduct made against the employer, the general superintendent is made responsible for the corporation, as well as the executive or managing officer.

Non-resident aliens are required to prove their dependency and cannot be conclusively presumed to be dependent.

Applications for adjustment of controversies may be filed with the Industrial Accident Commission by the attorney or other representative of an injured employe, if authorized to do so in writing.

A lien against compensation will be permitted for the support of dependents, as well as for the living expenses of the employe.

Self-insurers shall not be required to pay sums into the State Compensation Insurance Fund to cover liability for compensation, except in life pension cases.

It is a misdemeanor not to report forthwith a fatal industrial injury, by either telephone or telegraph, to the Industrial Accident Commission.

An injunction may be issued against an unsafe place of employment if it constitutes a serious menace to employes, provided that such application for an injunction comes from the Industrial Accident Commission or a member of the Commission.

The Commission is authorized to tag dangerous machinery and the use of such machinery is prohibited until the tag is removed by an authorized representative of the Commission.

Chapter 183 creates a liability on the part of the employers or their insurance carriers, in addition to any liability heretofore fixed by law, in case of the death of an employe who leaves no dependents. Under such conditions it is required that a death benefit of \$350 be paid and the Industrial Accident Commission is authorized to draw upon the fund created for the promotion of re-education and rehabilitation of persons disabled in industry in California. This new law was passed in response to a public demand that crippled men be aided in acquiring new occupations. It will reduce dependency and prove of material benefit to the citizens of the state.

KONGOZAN ELECTRIC RAILWAY COMPANY

Kongozan, the celebrated mountain in Chosen, noted for its fine view, is soon to have an electric railway winding up it. The project has long been contemplated by a group of influential business men in Tokyo and the preparatory work is now under way. The project will connect Tetugen Station of

the Chosen Trunk Line and Kongozan by an electric railway. Permission to harness the Kanko river for water power has been secured, and the plans for the electrical work are now being worked out. Some 5000 kw. will be developed from the site, a part of it being used for the railway and the remainder reserved for general use. The total length of the railway will be about 63 miles.

LINE EXTENSION

The Sioux City Service Company is contemplating an extension of its lines to supply Ponca, Neb., and Jefferson, S. D. The extension will probably consist of a twenty-mile addition to one of the 13,200-volt lines already in use.

BRONZE IMPULSE TURBINES FOR JAPAN

Other countries than our own are feeling the approaching fuel shortage and the need of developing all available water power. This is strikingly evidenced by the equipment now being built for the Aomori Electric Light Company, of Japan, by the Pelton Water Wheel Company.

The hydraulic unit is a 5000 hp., 560 ft. head double nozzle impulse turbine, constructed almost entirely of bronze. The water available for power purposes contains a small increment of sulphuric anhydrite and the bronze construction was necessary to prevent corrosion resulting from the presence of the acid in the water.

All parts of the equipment liable to contact with the water are of solid bronze, or bronze-covered, except the wheel housing, which is lead lined. All other parts of the unit not directly subject to contact with the water are given special non-corrosive treatment to protect against fumes.

Previous small installations of steel units on the same water supply have suffered from corrosion, and two smaller units similarly constructed of bronze proved the necessity of using bronze for this work.

ELECTRICAL EDUCATION IN JAPAN

There are four universities in the Japanese Empire where electrical engineering is taught in college grades; they are the following:

Tokyo Imperial University; 5000 students,	Tokyo
Kyoto " "	Kyoto
Kyushu " "	Fukuoka
Sendei " "	Sendei

A considerable number of electrical papers are published in the country. Among them are the following:

Mazda Shimpo (News), deals principally with Mazda lamps and illuminating engineering.
 Ohm, journal of electrical engineering.
 Proceedings of Japanese Electrical Association, similar to N. E. L. A.
 Proceedings of Illuminating Engineering Society.
 Electrical Review, treating of electrical engineering.
 Electricity in the Present.
 The Standard, treating of the economics of electrical engineering and other electrical engineering subjects.
 Electrical Review.
 Electrical World, published at Osaka.
 Proceedings of the Japanese Institute of Electrical Engineers.
 Electrical World, published at Tokyo.
 Electrical News, published twice a month.
 The Electrician's Friend, published at Tokyo, twice a month.
 Electrical News, published three times a week at Osaka.
 Proceedings of Central Electrical Association.

STATISTICS ON THE ELECTRICAL INDUSTRY IN CHosen

At the end of March, 1918, the electrical companies in Kobe numbered twenty-one. The twenty-one companies consisted of nineteen power and light companies, including two under construction, and two railway, power and light companies.

The total engineering power for electric railway and power companies was 8023 kw., to which may be added 110 kw. in plants under construction. The number of power plants was eighteen and showed an average of 446 kw. per plant.

The total length of line of electric railways was 27.1 miles, or reduced to single track, 36.2 miles. The number of cars was 108, of which 95 were motor-cars, 11 tenders, and 2 watering cars.

The number of electric light consumers was 40,701, the number of lamps 152,028, and the total candle-power 1,806,279. Compared with the end of August, 1917, there was an increase of 18,417 lamps, or 9.6 per cent, and of 153,417 candle-power, or 9.3 per cent.

In the electric power field the total number of consumers showed 297, number of motors 329, and total hp. 2744.

The total capital for electric power, light and railway companies amounted to 14,940,000 yen, and the average dividend was 9.0 per cent per annum.

EXCHANGE PROFESSORSHIPS BETWEEN UNITED STATES AND CHILE

Ratification by the government of Chile and the University of Chile of plans for the exchange of professors and instructors between the United States and the South American republic formulated by the University of California on Hispanic Relations has been effected by official decree of the government of Chile through its minister of public instruction, Pablo Ramirez. An appropriation of \$12,000 for the coming year had been provided under the decree signed by President Sanfuentes of Chile.

Chile's official ratification of the exchange professor project marks the first definite result of plans of the late Professor H. Morse Stephens whereby the University of California was to become a center for exchanges of professors and students with the leading Hispanic countries of the world, and for the study of the history and contemporary problems of Spain and Portugal, and more particularly of the Hispanic republics in the two continents of the Americas.

A committee of distinguished educators from the Chilean republic, headed by Dr. Don Pedro Aguirre, arrived in Berkeley early in January of this year and proposed a series of permanent exchanges not only of professors of universities, but also of teachers of high schools and technical schools, including women as well as men. Senor Aguirre's committee further proposed to make use of the University of California as a clearing house whereby the university authorities should arrange for all exchanges in this country.

The exchanges are by no means to be limited to professors of the University of California or even to teachers in the schools of the state. An earnest effort will be made in every case to select the candidates who will best serve the purposes of the exchange.

FOR ELECTRICAL ENGINEERS

The United States Civil Service Commission announces open competitive examinations for the positions of electrical engineer and assistant electrical engineer, for men only. Vacancies in the Signal Service at Large, Washington, D. C., and in positions requiring similar qualifications, will be filled from these examinations, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

Certification to fill the higher-salaried positions will be made from those attaining the highest percentages in the examinations.

The duties of these positions comprise the development and design of electrical equipment and especially Signal Corps storage batteries, or the administration of commercial telephone systems and installations of government-owned systems.

Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the weights indicated:

1. Education, training, and experience.....	60
2. Publications, reports, or thesis (to be filed with application).....	40
Total.....	100

NEW INSTALLATIONS IN NEBRASKA

The Municipal Light and Water Company of Lincoln, Nebraska, is doubling the capacity of one of its pumping plants at 17th and Van Dorn streets. A second unit similar to the one which has been in operation for two years is being installed. It consists of an Allis-Chalmers 500 hp. Diesel engine, and 325 kw. generator.

GROWTH OF TRADE IN CHILE

The following figures are given concerning the imports and exports of the Republic of Chile for the years 1913 and 1918:

	Imports	Exports	Trade Balance
1913.....	\$118,626,411	\$140,845,390	+\$22,218,979
1918.....	143,280,000	259,680,000	+\$116,400,000

The year 1913 witnessed several important developments in the industries of Chile. The first shipyards were built, the meat packing industry was established and an extensive development of coal, iron and copper deposits took place.

AMERICAN-RUSSIAN TRADE IN 1918

The total trade between the United States and Russia fell off to \$28,000,000 in the calendar year 1918, as against \$438,000,000 in the preceding year. Imports from European Russia in 1918 (\$7,000,000) were more than half of the 1917 figures (\$12,000,000), and imports from Asiatic Russia showed an actual increase from \$2,200,000 to \$4,000,000, due to the \$2,000,000 worth of platinum recorded in 1918. The great decrease in the total was principally in the export trade, which amounted to only \$9,000,000 to European Russia and \$8,500,000 to Asiatic Russia, a decline of 97 per cent and 93 per cent, respectively.

The following table shows the imports into the United States from European and Asiatic Russia and the exports from the United States to European and Asiatic Russia for the last six calendar years:

Imports and Exports	1914	1915	1916	1917	1918
Imports from—					
European Russia	\$12,306,334	\$2,433,222	\$4,478,990	\$12,350,179	\$6,784,603
Asiatic Russia	2,263,063	653,373	4,139,705	2,164,252	3,975,404
Total imports,	14,569,397	3,086,595	8,618,695	14,514,431	10,760,007
Exports to—					
European Russia	22,260,062	125,794,954	309,806,581	315,250,020	8,902,449
Asiatic Russia	5,696,275	44,436,875	160,701,673	109,260,439	8,433,069
Total exports,	27,956,337	170,231,829	470,508,254	424,510,459	17,335,518
Total trade,	42,525,734	173,318,424	479,126,949	439,024,890	28,095,525

NEW TELEPHONE SYSTEM FOR REPUBLIC OF CZECHOSLOVAKIA

The Republic of Czechoslovakia (comprising Bohemia, Moravia, Silesia, and Slovakia) plans to remodel, enlarge, and reequip its telephone system. For this purpose a mission consisting of representatives of the Department of Post, Telephone, and Telegraph, and experienced engineers will be sent to the United States to study and report on the various systems, switchboards, apparatus, appliances, etc., and recommend what in their opinion would best suit the conditions in the new republic.

The United States with its network of telephones is recognized as positively the best field for such research, the ultimate object of which is to place contracts for a complete and thorough telephone system, providing service not only for the territory of the republic, but also taking care of its needs as the leading country of central Europe, through which runs the great trunk line of railway connecting Hamburg, Prague, Vienna, and Trieste, and where important development of

waterways and railways is destined to take place in uniting the North Sea countries with South Poland and the Ukraina, the upper Elbe (Labe) and Oder (Odra) with the Danube, and Czechoslovakia with Hungary, Roumania, and Jugoslavia.

LE CONTE MEMORIAL LECTURES

The series of scientific lectures given in the Yosemite under the University of California Extension Division proved a pronounced success. The public interest in the course was manifested by the size of the audiences. The average attendance at the lectures was about 275 people, with the exception of Dr. Bade's address on "John Muir's Services to the Nation," which was heard by fully 1500 people.

The lectures, which are to be given each year, are known as the Le Conte Memorial Lectures, instituted in honor of the naturalist and geologist, Joseph Le Conte, who for thirty years was a member of the faculty of the University. The speakers are all men of recognized standing in their various fields. Each gave a series of three lectures, making twelve in all.

It is planned to publish the lectures in suitable form for circulation throughout the state and country, helping thus to make more widely known the varied attractions of one of California's most precious scenic possessions, Yosemite National Park.

FOREIGN DEMAND FOR MATERIALS

Many of the public works in the Dutch East Indies, which were suspended during the war, owing to the scarcity of materials, are being resumed, and a demand is developing for plant equipment and materials for waterworks, electric and railway undertakings, and harbor improvements.

WATER POWER SITUATION

With demands of industries and public utilities in northern and central California upon hydroelectric power 5 per cent greater than at this time last year, and streams lower than in July, 1918, the immediate future is regarded with concern by power users. An encouraging feature of the situation is the volume of water in the storage reservoirs, which is greater than in July, 1918. But this increased volume, if called upon, authorities say, is not sufficient to take care of the increasing consumption of power and therefore early and abundant rains must arrive to relieve what may develop into an emergency. Reservoir supplies are being drawn upon at the present time.

Charts kept in the offices of H. G. Butler, power administrator in the Railroad Commission, show the daily condition of the reservoirs, the hydroelectric "load" in the northern and central districts and correlated facts. The present markings on these charts confirm the anxiety of power users.

Demands upon hydroelectric power are greatest during May, June, July and August. Almost all water impounded has to do double duty, for irrigation as well as power usage. In September, irrigation needs drop off, but in late October or early November the lighting loads are present.

The interconnection with the California-Oregon Power Company, which brings in about 7000 hp. from the northern part of the state and Oregon, and which was completed about January 1, and a new steam turbine of about 20,000 hp. capacity being installed by the Pacific Gas & Electric Company, which will be ready for operation about the middle of August, are the only additional sources of power to meet the increased load.

POSTAGE TO AUSTRALIA

Several organizations in Australia have informed the Foreign Trade Department of the San Francisco Chamber of Commerce that the failure of merchants to place the proper amount of postage on letters and circulars is causing irritation which may lead to a loss of business unless it is corrected.

The Foreign Trade Department urges that all mail be fully prepaid. The rate on first class matter is 5 cents for

the first ounce and 3 cents for each additional ounce, or fraction of an ounce. The rate on other matter is the same as in the United States.

SAN DIEGO AS AN AIRCRAFT CENTER

Congress has appropriated \$6,000,000 for a Naval Aircraft Experiment Station and it is believed that San Diego will be the chosen location for the new station. This, in connection with the North Island Naval Air Station now located near San Diego, would make it a center of aeronautical activities in the United States.

WAR LOAN ORGANIZATION

All the war financing organizations of the Twelfth Federal Reserve district have been consolidated by Governor John U. Calkins of the San Francisco Federal Reserve bank into the War Loan Organization of the Twelfth Federal Reserve district with Robert E. Smith, president of the Title and Trust Company of Portland, as director and C. A. Farnsworth, Twelfth District Liberty Loan Publicity Manager, as associate director.

The War Loan organization will direct closing up of the business of the Liberty Loan organization and also look after the sales of certificates of indebtedness and War Savings certificates and stamps. Particular attention will be given to the sale of the new Treasury Savings Certificates recently issued by the U. S. Treasury Department. They are in denominations of \$100 and \$1000 and the interest is compounded quarterly as with the War Savings stamps.

Director Smith made a spectacular distribution of the Treasury Savings Certificates throughout the Twelfth District. Hurrying from the Federal Reserve bank by auto and ferry to the aeroplane field back of Berkeley, Smith took the passenger's seat in a De Havilland bomber from Mather Field, Sacramento, with Lieutenant E. E. Neubig as pilot. A record-breaking flight was made to Portland. From there Smith raced down the Willamette and Columbia rivers to Kalama in a motor boat, proceeding by auto to Seattle in time to hand a bundle of the Treasury Savings Certificates to the captain of a fast mail steamer about to sail for Alaska.

TRADE NOTES

New Agency —

The Roller-Smith Company, 233 Broadway, New York City, announces that it has made an agency arrangement with Mr. L. B. Gottschall, 211 No. St. Paul street, Dallas, Texas. Mr. Gottschall will handle the Roller-Smith Company's lines of instruments, meters and circuit breakers in the State of Texas, with the exception of a small portion in the western part of the state. He has had an extensive experience in the sale and installation of electrical apparatus in his locality and his technical ability and wide acquaintance with the trade place him in an excellent position to handle the Roller-Smith Company's rather complex lines.

Change of Address —

Keeler, White & Company, electrical manufacturers' agents at San Francisco, have moved to 509 Mission street, where they have twice the floor space of their former offices and warehouse.

New Sales Manager —

H. R. Basford of 431 Sutter street, San Francisco, announces that A. S. Kedzie, formerly of the Creighton Morris Company of Oakland, California, has joined the Basford forces as sales manager of the vacuum cleaner, ironing machine and washing machine department. Mr. Kedzie has made a specialty of household devices for many years.

Removal Notice —

The Magnavox Company of San Francisco will move their advertising department to 2735 East 14th street, Oakland. The factory will also be on the Oakland side, though the San Francisco office will be retained.

LATEST IN EVERYTHING ELECTRICAL

(An ingenious current-saving device appears in the form of a door-bolt switch which prevents light from being run in an unoccupied and closed room. Other items presented in this review are a plural socket plug, an improved candle socket, a volt-ammeter and a three heat electric iron.—The Editor.)

THE PLURAL SOCKET PLUG

The Ajax Plural Socket Plug was designed to meet the need for a one piece two way plug socket and made primarily for the use of a lamp and an appliance. The old type cluster

plugs were originally intended to accommodate two lamps instead of one, as at the time these were placed on the market, lamp efficiency had not been brought to its present high state, and unit lamps of high efficiency were an unknown quantity.

Today if a user needs more light with a single socket, he simply uses a higher efficiency lamp and not two lamps as formerly

was necessary. Therefore the need of a two way or plural socket plug is to accommodate one lamp and an appliance such as fan, portable lamp, iron, grill, washing machine, vacuum cleaner, etc. And with only such need the user obviously wishes to continue using his lamp in the position originally intended on his fixture. The Ajax Plural Socket Plug, manufactured by the Ajax Electric Specialty Company of St. Louis, accomplishes this primary requirement. It is made in one piece, eliminating the chances of poor contacts, special terminals and loss of parts.

Special features of the device are: One piece "Bakelite" insulation—a heat resisting composition of highest efficiency, allowing use of any style of standard lamps in either socket without affecting the composition. Bakelite is of great density and cannot be broken by ordinary handling.

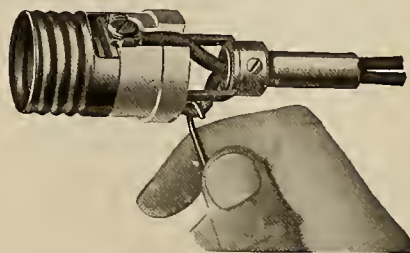
The main socket remains directly in line with the plug, allowing the lamp to continue in the position originally intended by the fixture. The size of the Ajax plug has been reduced, so that the shade holder ring on the main socket now accommodates an ordinary brass shell socket shade holder.

In the diversified use to which this article is put, every kind and style of plug or standard lamp base must give good contacts in the sockets. These various makes of plugs and lamp bases are not uniform, and to meet this condition a spring center contact has been made in the sockets, ensuring good contacts on all plugs or lamp bases.

AN IMPROVED CANDLE SOCKET

Although candle sockets have contributed not a little to the artistic merits of lighting fixtures, their mechanical construction has left much to be desired by the fixture manufacturer in the way of convenience of installation and wiring. The design of the Bryant Keyless Candle Socket, manufactured by The Bryant Electric Company of Bridgeport, Conn., has been greatly improved in this respect, as will be noted from the accompanying illustration. In wiring candle sockets, as hitherto made by this and other companies, it was necessary to fish the wires through a hole cut in the side of the stem on which the socket was to be mounted, and from this point lead them outside the tubing to the binding posts of the socket. In the improved Bryant socket there is a hole in the center contact of approximately the same diameter as the inside diameter of the tubing which is usually used for making the stems on which to mount the sockets. The

socket is dropped over the wires as they protrude from the stem and is screwed in place—this operation being possible without twisting the wires or damaging them in any way.

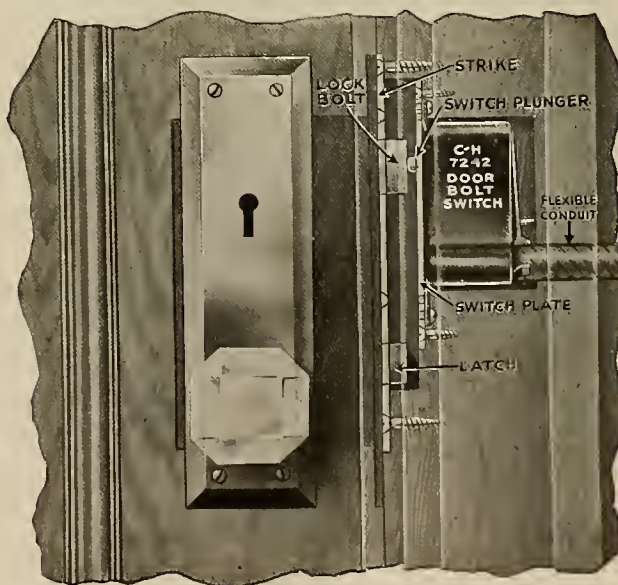


A candle socket which has special features for facilitating installation and wiring

After the socket has been firmly attached the wires are pulled back by means of a hook or any convenient tool through the open yoke or "hickey" which forms a part of the socket, and are led through the grooves in the porcelain to the binding screw terminals.

NEW DOOR BOLT SWITCH

To prevent the wasteful use of electric light in guest-rooms, hotels and clubs often display in each room a sign reading, "Please turn out the lights when leaving the room." The new C-H Door Bolt Switch which has been developed by the Wiring Device Department of the Cutler-Hammer Manufacturing Company accomplishes what the signs aim to do.



This door-bolt switch prevents waste of current by automatically turning off the light whenever the door is locked from the outside. The phantom view in the above cut shows the C-H Door Bolt Switch mounted in the door jamb with wood screws. They can also be mounted on the strike by using spacers and machine screws furnished with the strike without the spacers, two holes being tapped in the switch plate for the screws.

When the occupant of a room leaves and locks the door from the corridor side, this switch is operated by the lock bolt, the lights within the room are cut off, and the wall switch made inoperative. When the door is unlocked the wall switch may be used to control the lights. This new Door Bolt Switch, although similar in shade to the well known C-H Door Switches, is operated by the lock bolt of a two-bolt lock, such

as is generally used in hotels. They are mortised in the lock side of the door jamb in back of either a flat or box strike, and are connected in series with the regular wall switch which controls the lights within the room. As it is customary to install the regular wall switch conveniently near the door, very little additional wiring is necessary for the installation of the Door Bolt Switch. The accompanying illustration shows the details of this new device and how the movement of the lock bolt will push against the switch plunger and thus open the switch. Being purely a mechanical device, its life should be as long or longer than the ordinary wall switch. Since it works with the locking of the door the reader will readily appreciate that its regular use is practically automatic and that it will be instrumental in the saving of much lighting current to the hotel manager.

A VOLT-AMMETER

A convenient volt-ammeter for quick and accurate testing of lighting and starting systems has been designed by the Roller-Smith Company of 233 Broadway, New York. This instrument, known as the "Handy" type, measures 4 by 5 by



This ammeter, measuring 4 by 5 inches, weighs 20 oz. and is especially designed to meet the needs of linemen, testers and others who require a compact instrument of special accuracy.

2 in. and weighs 20 oz. The mechanism is an efficient permanent magnet of the moving coil type; the scale is hand calibrated, and the base is of special close-grained wood so that the instrument may be laid on a battery without short circuiting it.

The case is of drawn brass heavily enameled in black. The binding posts have non-removable tops.

The entire mechanism is mounted on one base, thus insuring correct alignment of all parts at all times.

The volt-ammeters read amperes normally, a button being pressed to give the reading of the volts.

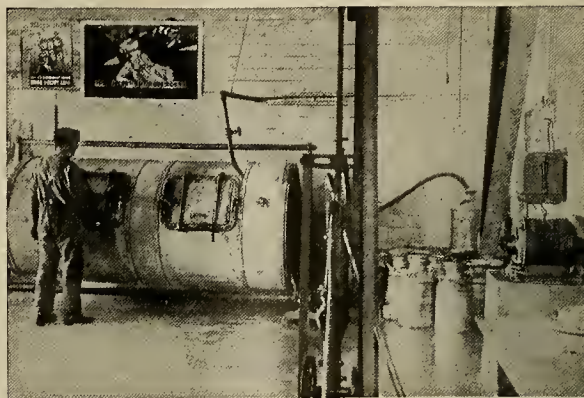
THE CENTRAL STATION AND THE RURAL DISTRICT

The last two years have been very prosperous ones for the farmers, especially through the Middle West. Money is plentiful, and the growing familiarity with power apparatus, through the general use of tractors and gasoline engines, has created a demand for more power. The gasoline engine has, so to speak, whetted the farmer's appetite for more; it has shown him what the possibilities are, and at the same time its limitations and the bother it gives him have made him a live prospect for the convenient and reliable power of the electric line.

The Cambridge Light & Power Company of Cambridge, Wis., has built a transmission line 14 miles long from a near-by substation. The line serves a large number of farmers, each of whom pays for his own transformer and protective apparatus. These are all of Westinghouse make and range from 1 to 5 kva. The farm load, in addition to lights in house and buildings and yard generally includes a water pump automatically controlled delivering into a pressure tank for house use; a feed grinder and a washing machine. In some cases a single 3 hp. Westinghouse motor drives a line shaft to which are belted a pump, washing machine, churn, and separator. Farmers are good customers for appliances

and practically every home has an electric iron and table ware or vacuum cleaner.

In Cambridge, a town of about 1000 population, the Cambridge Light & Power Company has two 25 kva. transformers serving about 130 lighting consumers, as well as a grist mill, a creamery, a garage, and the pumping plant. In



A Westinghouse motor operating in a creamery. Electricity is coming to be used extensively in all departments of farm work.

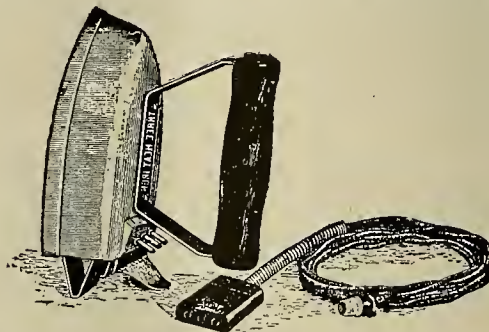
the creamery is a 7½ hp. Westinghouse motor driving a separator, churn, deep-well pump and cream pump. It displaces a steam engine, and the owner says that even though he must keep his boiler in service for sterilizing and water-heating, he finds the motor a paying investment in convenience. In the garage is a 5 hp. motor driving various machines, and in the pumping plant is a 10 hp. motor supplying water to the town.

So far the company has shut down two low-voltage gasoline-electric sets, and in the near future expects to shut down five more. These plants are considered "trail breakers" for central station service; they are not powerful enough for the heavier farm service, and when central station power is available, the private plant is out of the running.

The prosperous farmers of the vicinity are very anxious to have electric service and the company has no difficulty in adding to its load as fast as it can build the lines.

A THREE-HEAT ELECTRIC IRON

An electric iron which can be regulated to give three different degrees of heat has been put on the market by the Redtop Electric Company, Inc., of New York. The regulation is accomplished by the particular plug combination shown in the illustration. The three heats are plainly marked and



An electric iron which can be regulated to give three different heats

numbered on the plug—3. High Heat, 2. Medium Heat, 1. Low Heat—and it is only necessary to place the plug so that the number on it representing the desired heat is over the corresponding number plainly marked on the iron. The heating area covers the entire bottom of the iron, thereby ensuring the maximum heating surface at the minimum cost of operation. The weight of the iron is 6½ lbs.; a six-foot cord, a heat regulating plug and a stand or heel accompany each one.

Books and Bulletins

Electric Power Transmission

by Alfred Still, Professor of Electrical Design, Purdue University, Fellow A. I. E. E., Member Inst. of Civil Engineers; 407 pp.; size 9½ by 6¼ in. Published by the McGraw-Hill Book Company, Inc., New York, and on sale at the Technical Book Shop, San Francisco. Price \$3.50.

Although treating mainly of the fundamental principles and scientific laws which determine the correct design of overhead electric transmission lines, the book is intended primarily to meet the needs of the practical engineer. Higher mathematics have been avoided, and a special effort has been made to explain as simply as possible the derivation of practical methods and formulas. For the solution of alternating-current problems vector diagrams and trigonometrical formulas have been freely introduced with a view to providing a suitable text book for engineering students specializing in power generation and transmission, and desiring a work which includes practical application of electrical engineering theory.

The treatment is largely from the standpoint of the engineer who is entrusted with the work of making calculations and drawing up the necessary specifications for a wood pole and steel tower line, respectively.

Talks on Talking

By Grenville Kleiser, formerly Instructor in Public Speaking at Yale Divinity School. 150 pages; size 7½ by 5 in. Published by Funk & Wagnalls Company, New York and London.

This handy little volume comprises nine brief chapters written in a direct and interesting style and strictly to the point. "The tedious talker is one without terminal facilities," says the author—and lives up to his dictum. Arbitrary rules are avoided—with the exception of an illuminating chapter on don'ts for public speakers which includes such admonitory gems as, "Don't rise on your toes" and "Don't 'point with pride.'" Preachers and salesmen are each accorded a special chapter; for the rest the volume handles the fundamental principles of making talks effective and is arranged in such a way that the material is easily accessible as a practical guide when needed, supplying innumerable valuable hints.

Water Wheels

An extremely well-arranged and pleasing booklet has been issued by the Pelton Water Wheel Company of San Francisco. It is printed on heavy glazed paper, with light blue cover, and contains a large number of exceptionally attractive illustrations. The first few pages give data on the water supply for Pelton water wheels, methods of weir construction and measurement, a table for weir measurement, a useful collection of general hydraulic information, and data required for estimates in hydraulic work. Following are descriptions and illustrations of the various types of Pelton water wheels together with valuable technical data in connection with water-wheel use.

Bureau of Standards

"New Forms of Instruments for Showing the Presence and Amount of Combustible Gas in the Air" is the title of a paper by E. R. Weaver and E. E. Weibel issued as Scientific Paper No. 334 by the Bureau of Standards. The authors are Associate Chemist and Associate Physicist, respectively, with the Bureau. Their paper contains a description of experimental work upon the combustion of gas at the surface of an electrically heated wire and the application of this phenomenon to the design of instruments for detecting the presence or indicating the amount of combustible gas in the air. Copies of the paper may be obtained from the Bureau of Standards on request.

California Industries and Land Show

An illustrated booklet has been issued describing the plans for the California Industries and Land Show to be held at the Exposition Auditorium, San Francisco, October 4th to 19th. There will be an elaborate electrical display, with Frank Fagan, illuminating expert for the Edison Lamp Works of the General Electric Company, Oakland, in charge. Mr. Fagan is chairman of the Land Show Committee.

Electrical Precipitation

An attractive circular describing the Westinghouse achievements in the field of electrical precipitation has just recently been issued. The process applies to copper, lead or zinc smelters, blast furnaces, chemical, acid and cement plants for the recovery of valuable material otherwise wasted. Water can be precipitated from oil, dust removed from ventilating systems, etc. It is also applicable to operations such as round houses, which by their smoke or fumes are a nuisance to the surrounding territory.

The necessary apparatus for the Precipitation Process such as motor-generators, transformers, rectifiers, motors, switchboard and accessories are shown installed, and are described in detail in this circular, which is well printed, and illustrated with effective photographs.

Cutler-Hammer Stickers

Among other publicity work on the C-H Seven Fifty Switch, The Cutler-Hammer Manufacturing Company has prepared eight effective two-color stickers which will be used on the outgoing mail from the company's home and eight district offices, and will be furnished to dealers, contractors, jobbers and central stations, for use on letters, envelopes, folders, packages, and similar material. Four of the stickers have been prepared especially for the jobber and others who do not come in direct contact with the consumer, while the other four are especially for the dealer. They direct the customers to bring their appliance cords to the dealer to have them equipped with C-H Seventy Fifty Switches—thus following the trend of all the national and direct advertising being done on this safety switch.

Railways in China

The Ministry of Communications of the Republic of China has issued a report giving statistics of government railways for the year ending December 31, 1916. In addition to tables and discussion the report includes a number of maps and charts showing density of traffic operating expenses, and so forth.

Bureau of Mines

The Bureau of Mines issues as Technical Papers 212 and 216 respectively "The Determination of Combustible Matter in Silicate and Carbonate Rocks" by A. C. Fieldner, W. A. Selvig and G. B. Taylor; and "Vitiation of Garage Air by Automobile Exhaust Gases" by G. A. Burrell and A. W. Gauger.

Bulletin 178 C of the Bureau is by Van H. Manning—"Petroleum Investigation and Production of Helium." This is an advance chapter from Bulletin 178, "War Work of the Bureau of Mines."

The monthly statement of the Coal Mine Fatalities in the United States, compiled by Albert H. Fay, has been issued by the Bureau of Mines for the month of April, 1919.

"The Preparation of Manganese Ore," by W. R. Crane, is a paper recently published by the Bureau of Mines as No. 17 of the Minerals Investigation Series.

Bulletin 168 of the Bureau of Mines is the work of Dorsey A. Lyon and Oliver C. Ralston, and is entitled "Recovery of Zinc from Low-Grade and Complex Ores." As one of the Petroleum Technology Series the Bureau publishes Bulletin 176—"Recent Developments in the Absorption Process for Recovering Gasoline from Natural Gas," by W. P. Dykema.

NEW ELECTRICAL DEVELOPMENTS

(Extensive irrigation developments are features of the Northwest news for the past two weeks. The Hetch Hetchy project is in the foreground in Pacific Central activities and the Southwest reports the coming erection of several large plants. Developments in the Inter-Mountain district comprise a little of everything, from street-lighting to irrigation.—The Editor.)

THE PACIFIC NORTHWEST

PASCO, WASH.—The Pasco-Page Telephone Company has been incorporated here.

SEATTLE, WASH.—A large quantity of electrical equipment will be required in connection with the construction of the proposed 18,000,000-ton dry dock at the plant of the Ames Shipbuilding & Dry Dock Company, including complete electrically operated pumping apparatus, motors, etc.

OLYMPIA, WASH.—Present valuation of the Pacific Power and Light Company properties serving Yakima, Walla Walla, Goldendale and White Salmon geographical divisions in eastern Washington has been fixed by the public service commission at \$6,207,532, preliminary to granting an increase of rates.

SEATTLE, WASH.—Legislation has been set in motion to obtain congressional aid for the big reclamation project in Kittitas county, Washington. Representative Summers introduced a bill to appropriate \$7,000,000 for expenditure on the Kittitas high line unit, which is to be an extension of the Yakima project.

VANCOUVER, WASH.—The question of draining Vancouver Lake assumed a trifle larger proportions when it was learned that the City Port Commission intends to investigate their interests in the affair. It appears that a recent session of the state legislature gave the lake to the Port Commission for the purpose of creating, some time in the future, a deep water harbor for Vancouver.

PENDLETON, ORE.—Despite the fact that it was impossible to obtain official assurance of the approval of the McKay creek dam project at this time because of lack of funds for any irrigation extension until the Lane bill or some other similar measure is passed by Congress, E. P. Dodd, who went to Washington as the representative of this district in the matter, returned feeling that, as soon as funds are available, the project will be among the first to receive attention.

KLAMATH FALLS, ORE.—That the lands on the eastern side of upper Langell valley will be formally added to the Langell valley irrigation project at the regular meeting of the board of directors on August 5 is now generally expected, as all of the preliminary arrangements for this move have been made. This addition will bring the total of the proposed irrigated area up to approximately 30,000 acres and nearly double the amount of land now covered by the United States reclamation service here.

SALEM, ORE.—John H. Lewis, engineer-manager of the Warm Springs irrigation project, arrived in Salem recently to confer with members of the irrigation securities commission. The project recently asked certification of bonds in the sum of \$600,000 in addition to \$750,000 in bonds previously certified. The project contains approximately 39,000 acres, 29,000 of which are subject to irrigation. Mr. Lewis was formerly state engineer and is well versed in irrigation matters.

SALEM, ORE.—The state irrigation securities commission has received an application from the Talent irrigation district in Jackson county for certification of bonds in the sum of \$45,000. Money derived from the bonds will be used in new work. The district includes about 8000 acres and \$175,000 in bonds already have been approved. The Squaw Creek irrigation district in Deschutes county has asked certification of an issue of \$15,000 for new work. This district

has 8000 acres, with bonds in the sum of \$98,000 already issued.

KLAMATH FALLS, ORE.—Modification of the contract between the California-Oregon Power Company and the government, by the terms of which the former threatens to reduce the water level of upper Klamath Lake, is asked in a telegram to Secretary of the Interior Franklin K. Lane, sent by the timber interests, mill owners and others interested in timber or its manufacture in this section. It is pointed out that those signing the telegram have made heavy investments tributary to the lake, in mills, box factories and log canals, relying upon the natural condition of the lake.

BEND, ORE.—In preparation for the starting of immediate construction of a 1500 hp. unit on Tumalo creek, in case the agreement already approved by the state for power rights is endorsed by eastern officials of the company, preliminary work has been started by the Bend Water, Light & Power Company. A second unit of like capacity is planned, to be erected as need arises. According to surveys already made, a 4000-ft. line of 40-inch pipe will carry water from the Columbia Southern ditch, returning the water from the power unit to the creek. Power will be brought to Bend over an eight-mile transmission line. It is possible that another line may be built to include farmers of Tumalo and Deschutes among the electric light users of the county.

THE PACIFIC CENTRAL DISTRICT

BAKERSFIELD, CAL.—The Kern county supervisors have called a \$40,000 water system bond election in the Oildale district for Aug. 5.

PASO ROBLES, CAL.—Daniel Fisher of San Jose has purchased 2000 acres of the Bolton estate and is planning an irrigation system by wells.

PITTSBURGH, CAL.—Several bonding propositions are to be submitted to the people in the near future. Among these will be the installation of an electrolytic lighting system.

LIVINGSTON, CAL.—A petition was presented to the Board of Supervisors of Merced county at their meeting on August 4th, asking for the organization of an irrigation district.

OAKDALE, CAL.—Plans are being prepared by the Calaveras Copper Company for a reservoir and power plant to supply electricity for their plant at Copperopolis, according to notice received by the Oakdale Irrigation District from the State Water Commission.

ANTIOCH, CAL.—The water supply is low and is liable to become worse from season to season as irrigation becomes more extensive at points above Antioch. Only one course appears to be open, and that is to try the experiment of sinking wells with a view to tiding over the low water period.

MARTINEZ, CAL.—Plans and specifications are being considered by the Contra Costa Gas Company for the construction of a modern dwelling house on their property at the corner of Melrose and Estudillo streets and the erection of a large gas storage tank. It is understood that the investment of the company here will exceed \$10,000.

OROVILLE, CAL.—Reports on both the Oroville-Wyandotte and Honeut-Yuba irrigation districts will be made by the state engineer at the same time, and when they are ready the

board of supervisors will call a special meeting for the purpose of fixing dates for the elections in the two proposed districts. A representative of the state engineer's office is expected in Butte county within a few days.

SACRAMENTO, CAL.—Oregon hydroelectric lines, connecting with California lines, are relieving the shortage of power in this state, which is greater than ever before, owing to unprecedented low water in all the streams. In addition it is reported that every steam power plant in the state is running to meet extra demands. Electricity is being generated from steam by the Pacific Gas & Electric Company.

MODESTO, CAL.—Bonds amounting to \$609,000, to provide funds for the construction of an electrical power plant, will be voted on separately on the same ballot with the Don Pedro reservoir project, according to a resolution adopted jointly by the Modesto and Turlock irrigation district directors. The proposition as outlined would result in the construction of a power plant with a capacity of 40,000 horsepower and sufficient to take care of the full capacity of the proposed Don Pedro dam.

MARYSVILLE, CAL.—F. L. Fehren of San Jose, who recently was denied a petition for creating an irrigation district by the board of supervisors of Yuba county, with the privilege of taking water from the Yuba river in this county, has made application to the state engineering department for 500 feet per second of waters of the Yuba and Feather rivers to irrigate 50,000 acres of land in Yuba county. The main canal which Fehren proposes to build will be forty miles long, the application states.

MARYSVILLE, CAL.—Competition with the Pacific Gas & Electric Company and the Great Western Power Company in furnishing electricity to Marysville, Sacramento and other valley towns is planned by the Marysville and Nevada Power and Water Company. Immediate construction of the first unit of the proposition is to commence at Bullard's Bar, near here. The contract for building the dam has been let to a San Francisco firm. The firm dam will be 40 feet high, to be increased next summer to 170 feet. Fifty men will be put to work to build it.

PORTERVILLE, CAL.—The Santa Fe Railroad has purchased from the Visalia Electric Railway branch lines constructed through newly opened citrus territory to connect with the Porterville Northeastern, a Southern Pacific subsidiary. Consummation of this deal, it is said by Santa Fe engineers here, means immediate construction of the proposed Porterville-Ducor branch of the Santa Fe, the leasing of trackage from the Southern Pacific from Ducor to Oil City, and the future routing of transcontinental traffic by the Porterville branch.

NEVADA CITY, CAL.—The capacity of Lake Van Orden, one of the storage reservoirs of the Pacific Gas & Electric Company, near the summit of the Sierras, is being enlarged by raising the dam an additional five feet. A large crew of men and necessary materials have been assembled, and the work will proceed rapidly. The water of Lake Van Orden is conveyed by canal to Lake Spaulding, fifteen miles to the west, and becomes a part of the great power generating system of the company. An additional unit is being added to the Lake Spaulding dam.

OROVILLE, CAL.—That if an irrigation district is organized in the Thermalito and Table Mountain sections, the Pacific Gas & Electric Company will guarantee to furnish water for at

least 20,000 acres, was the statement made by President John A. Britton of the Pacific Gas & Electric Company, to the Chamber of Commerce. Mr. Britton stated that the rehabilitation of the Thermalito distributing system, of the construction of the Concow impounding dam, and a more careful use of water would enable 20,000 acres to be irrigated in Thermalito and Table Mountain.

SAN FRANCISCO, CAL.—Bids opened by the Board of Public Works for the construction of the Hetch Hetchy dam in the Tuolumne river revealed the Utah Construction Company of Ogden and San Francisco as the low bidder on both types of dam asked for in the specifications. The only other bidder was R. C. Storrie & Co., of San Francisco. The Utah Construction Company offered to build the dam with an overflow spillway and radial gates for \$5,369,808.50. The Storrie bid on the same work was \$5,431,010, a difference in favor of the Utah of \$61,201.50. Upon the alternative bid for the dam with a syphon spillway the Utah company bid \$5,446,792.50, while the Storrie bid was \$5,475,910, a difference of \$29,117.50 in favor of the Utah company. The contract for the dam was awarded to the Utah Construction Company, and since the announcement there has been a steady sale of the Hetch Hetchy bonds.

REDDING, CAL.—Proposed irrigation projects, which would turn water on thousands of acres of fertile land in northwestern Shasta and Modoc counties, are being investigated by State Engineer W. F. McClure. The state official is accompanied by Secretary-Manager Chase of the Northern California Counties Association. The first project to be viewed will be on the McArthur estate, where it is proposed to irrigate 5000 acres and subdivide the land. Then Mr. McClure will go over into Big Valley to decide on the feasibility of a project which is planned to irrigate 22,000 acres. The inspection trip will end with a trip through Modoc county, the state engineer paying particular attention to Jess Valley, an irrigation project of 40,000 acres. Land owners in this district hope to get state financial cooperation in making the surveys. The High Sage and Crook's Canyon projects of 10,000 acres each also will be brought to the attention of the state engineer.

THE PACIFIC SOUTHWEST

PASADENA, CAL.—The Pacific Electric Company will install heavy girder rails and repave its right-of-way in Colorado street between Broadway and Lake.

LOS ANGELES, CAL.—The city council has called an election in the Westgate District for August 13 to vote on issuing \$700,000 bonds for constructing a water distributing trunk line.

IMPERIAL, CAL.—Imperial Irrigation District bonds to defray the expense of construction and maintenance of a water system from Hanlon Heading, to connect with canals of the local water companies, will be voted on soon.

PASADENA, CAL.—Work will begin soon on the construction of High Dam at Devil's Gate. The dam is to be 100 ft. wide at the bottom, tapering up to 80 ft. in width at the top. The structure will be more than 100 ft. high.

VENICE, CAL.—Mayor A. E. Coles has appointed a committee to investigate the proposed centering of the Pacific Electric tracks on the trolleyway. Venice and Santa Monica are anxious to have the tracks centered through both cities.

LOS ANGELES, CAL.—The Public Service Commission has under consideration the feasibility of having aqueduct water carried into about 20,000 acres of land in the Corajo Valley, Ventura county. It is suggested that water now allowed to run down the Santa Clara river during the winter season might be used by being impounded in reservoirs and released in the summer.

PHOENIX, ARIZ.—A resolution has been passed by the Public Service Commission declaring intention to construct a conduit of reinforced cement concrete to take care of the Salt River Valley Canal between the east line of Central avenue and the east line of Third avenue. A 4-inch centrifugal pump is to be erected at Third avenue for lifting water from the canal for irrigation purposes.

LOS ANGELES, CAL.—The new packing plant to be erected at Vernon by the California Provision Company of Los Angeles will consist of a number of buildings, including a boiler plant and refrigerating plant. The cost for equipment has been estimated at about \$75,000; the figure for the entire plant at \$125,000. The contract has been awarded to Charles B. Harp of Los Angeles.

POMONA, CAL.—Promoters of the irrigation district southwest of San Dimas, in which 20,000 acres will be supplied with water from San Gabriel Canyon, have made formal request to the State Water Commission for the privilege of diverting water from San Gabriel river and Puddingstone Canyon. A reservoir is planned to be built in the bed of Puddingstone Canyon—water to be brought down from San Gabriel river, San Dimas Canyon, etc.

EL CERRITO, CAL.—Voters of El Cerrito have decided against two bond issues totaling \$70,000 by failing to give the issues the necessary two-thirds majority to carry them. Proposition No. 1, providing \$60,000 bonds for a storm sewer system, lost by a vote of 105 for the bonds and 80 against. Proposition No. 2, for \$10,000 for fire-fighting equipment, lost by a vote of 88 for the bonds and 96 against.

LOS ANGELES, CAL.—The Goodyear Tire and Rubber Company of Akron, Ohio, has acquired a site near Los Angeles on which it proposes to erect a new plant. The works will consist of a group of buildings to include every department of operation, as well as an electric power station. The entire cost is estimated at about \$4,000,000, and a California corporation will be organized to construct and operate the plant.

LOS ANGELES, CAL.—Wage increases of from 2 to 3 cents an hour, affecting thousands of employees of the Los Angeles Railway Company and the Pacific Electric Company's lines, are announced. High cost of living was given by railway officials as the reason for the increases. Pacific Electric motormen and conductors will be paid from 41 to 49½ cents an hour; freight motormen, 53 cents an hour; brakemen and switchmen, 48 cents; trolleyman, 43 cents, and yard foremen, 53 cents. The Los Angeles Railway Company is paying practically the same scale.

SAN DIEGO, CAL.—Contracts calling for the expenditure of approximately \$1,000,000 for the installation of sewer, water and lighting systems and construction of the industrial group of permanent buildings, including administration building, power houses, storage plants and additional barracks at the marine brigade post in Dutch Flats, are expected to be awarded in September. Announcement was made by Com. Norman Smith, public works officer for the Twelfth Naval District, that plans and specifications for the proposed work are now being completed by public works officials.

THE INTER-MOUNTAIN DISTRICT

BRIGHAM CITY, UTAH.—Steel poles for the new street lighting system for this city have arrived and will be immediately put in place.

UNCON, IDA.—The Utah Power & Light Company is extending its distribution system to the eastern part of this town to take care of customers in this section.

PRESTON, IDA.—A certificate of convenience and necessity has been issued by the Idaho Public Utilities Commission, granting the Utah Power & Light Company permission to extend its lines into Franklin county, beyond Preston.

OGDEN, UTAH.—Efforts are being made by merchants and others interested in this city, to induce the Utah-Idaho Central Railroad to build an interurban line from Ogden through West Ogden and thence to West Weber and Plain City.

PRESTON, IDA.—A special election was held in the village of Weston, on the 11th of August, for the purpose of voting upon the issuance of municipal coupon bonds in the amount of \$8000, to pay the cost of constructing an electric light and power distributing system.

SALT LAKE CITY, UTAH.—The electrification of the Salt Lake, Garfield & Western Railway Company's line between Salt Lake City and Saltair Beach has finally been completed and the six new electric cars will be put into service, commencing August 3rd. Fifteen-minute service will replace the old schedule of forty-five minute service with this change.

POCATELLO, IDA.—Lightless nights may be inaugurated throughout certain districts of the state of Idaho to permit greater use of electricity for irrigation pumping purposes. A great demand has been made on the Power Company for current to pump water for irrigation on account of the extremely dry season, with resulting tax on the capacity of the various plants.

CARSON, CITY, NEV.—The Public Service Commission has granted the Bell Telephone Company permission to extend its lines to Tonopah. The extension will enable residents of Tonopah and Goldfield to talk direct with Reno and San Francisco. The company purposes to string its wires on the poles of the Western Union Telegraph Company, and to connect with the system of the Nevada-California Telephone Company, which has served the people of southern Nevada for several years.

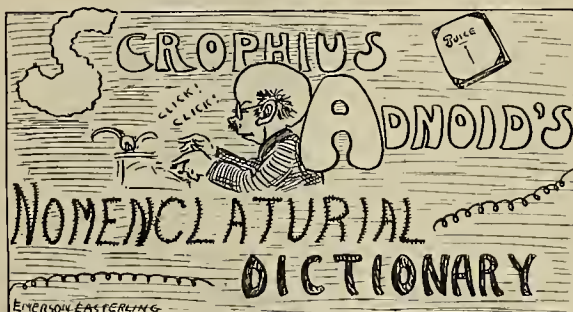
CARSON CITY, NEV.—The irrigation of Eagle Valley is a question that has been seriously considered for some time, and various plans have been proposed. Now that the Upper Carson dam seems in a fair way to be constructed interest has revived and serious thought is given to the matter of including Eagle Valley in the project. State Engineer Scrugham has announced that he and R. Conklin of the department of the interior will make a reconnaissance of the different projects capable of development in the state and the Eagle Valley project will be included in the general survey.

BOISE, IDA.—The installation of a new unit at the Lower Salmon Falls plant of the Idaho Power Company has just been completed and 4000 hp. additional output secured. This capacity will aid materially in providing necessary current for irrigation purposes for which there is an enormous demand this year. The question of interconnecting the system of the Idaho Power Company with that of the Utah Power & Light Company is also being considered by the officials of the two companies and the Public Utilities Commission. Such an interconnection would materially aid the Idaho Power Company in taking care of business in the west end of the territory which it now serves.

LOGAN, UTAH.—The installation of a new ornamental street lighting system for the principal business streets of Logan will take place shortly, according to plans now being perfected by Mayor Bullen and the City Commission. Everything incident to the installation is ready and the contract for actual construction will be let in the very near future. The installation of the new system will mark the end of the old wooden telephone poles which have been on the streets for several years. New and ornamental poles will support the street car trolley wires and the new lines. The new lighting district planned will cover from First South to Third North on Main street, from First West to First East on First North. On Main street two lights will be placed on each pole and on the other streets only one lamp will be on each pole.

THE VACUUM CLEANER — THE VACUUM CLEANER

CASUAL FACTS ABOUT OURSELF and about you, a bit of poetry written by a mutual acquaintance and a good story if we happen to have one on hand—that is what you will find on this page. Take it for granted you have dropped in for a chat in our office and are being entertained while you wait by the office boy or, as we have personified it here, the office Vacuum Cleaner. You would hear a touch of gossip and then besides, some of the more important items of life which formality excludes from the regular columns of a technical magazine. This rich harvest has been placed in care of our electrical janitor and is here presented for the diversion of an idle moment.—The Editor.



SCROPHIUS ADNOID'S NOMENCLATURAL DICTIONARY

- Ampere—Gallons per minute of juice.
 Battery—Juice barn.
 Current—Amount of amperes that the voltage shoves along the line.
 Direct current—The straight goods in the electrical line; no come-back.
 E.M.F.—No, it is not a make of automobile. It is the goods.
 Farad—The reputation of a condenser.
 Ground—Anything from a wet fence post to a person that the juice finds a circuit through back to the source.
 High tension—Hot stuff.
 I—An algebraic symbol by which the dopers try to figure out just how much it is going to cost Mrs. Ivan Ovaliditch to burn that new toaster of hers for ten minutes per day for seven weeks.
 Juice—That's telling.
 Kilowatt—What the meter-users worry about.
 Laminations—The things the kids use for sailers when a transformer burns out.
 Micro-farads—The way you measure the capacity of the condenser that goes onto your medical shocking coil; if you are very nervous you even do some subdividing of the micro-farads.
 N—It does not necessarily mean "nothing," but we will let it stand for it this time.
 O—The amount the average lineman's brains would total if asked to answer electrical questions in an examination.
 Power factor—The stuff that the guy that owns the plant is interested in.
 Resistance—The junk that keeps the meter from doing a fandango when a circuit is closed.

Secondary—The opposite of primary.

Theory—That with which the engineers try to bulldoze the public into their way of thinking.

Unit—A lot of things. Sometimes a generator in a power plant.

Variation—The condition that enters into a man's pay check when he lays off.

X-ray—The stuff the doctors burn you up with trying to cure you of some new kind of psychic disease.

Y—This must be a misprint as you see it in any electrical work—perhaps it is not, though.

Z—Probably stands for the time that a man puts in telling the other fellow how he used to raise the dickens when he was on a floating gang.

—EMERSON EASTERLING.

ENGINEERS OF YESTERDAY—15. FRANKLIN

(Series compiled by A. L. Jordan)



During the performance of the famous "kite experiment," where was Franklin?

Safe and dry in the shed pictured above by the artist. The experiment was of such great importance because it was the first proof (1752) of the identity of lightning and the electric spark and led to the invention of the lightning rod.

Benjamin Franklin (1706-1790) was one of the world's great geniuses. Apprenticed to a tallow-chandler, becoming a printer, then a writer, organizing the first police force and fire company in Philadelphia, interesting himself in education, in paving, lighting and building hospitals, organizing the American Philosophical Society, he here became postmaster. The pages of United States history record other public achievements, as his connection with the "Stamp Act," being on the first foreign mission (to England), assisting in drawing up the Declaration of Independence, culminating in appointment as Commissioner to France. He was made a member of most of the important societies of the world, including the Medical Society of London and the Royal Society. His activities in scientific and practical lines were numerous. Among others they were investigations as to the causes of earthquakes and whirlwinds, aeronautics, navigation (water-tight compartments, floating anchors, oil for calming high waves) and clock-making. He invented bifocal eyeglasses, the "Franklin stove" (our hot-air furnaces use the principle) and a remedy for smoking chimneys. He ventured to oppose Newton's theories of light, believing in the existence of ether waves. In his later years we read of his advocating the abolition of slavery. His best known work is his "Autobiography."

JOURNAL OF ELECTRICITY

VOL. 43 NO. 5

SAN FRANCISCO, SEPTEMBER 1, 1919

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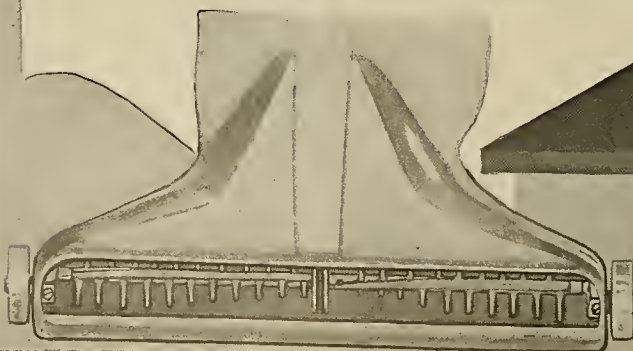
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This is Premier's motor driven floor brush with many pliable rubber fingers—the brush that also picks up lint and threads.

JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

CLOTILDE GRUNSKY, Associate

VOLUME 43

SAN FRANCISCO, SEPTEMBER 1, 1919

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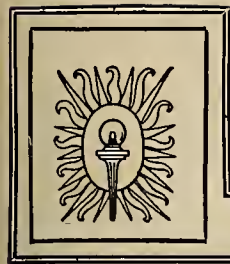
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BREAKING A RECORD IN WATER WHEEL EFFICIENCY

The part which electricity plays in the operation of the giant lock system of the Panama Canal is strikingly presented in the article on page 198 of this issue. The great importance of this gateway of commerce to the Pacific Coast lends peculiar significance to the fact that it is in large measure Western genius, through the invention and development of the Pelton water wheel, which has made possible the electrical records established in the Canal hydroelectric plant at Gatun. The astonishing efficiency of 95.4 is reported of the operation of the Pelton water wheel in the official government records, an attainment which marks a new level of achievement for this type of turbine.





JOURNAL OF ELECTRICITY



DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43

SAN FRANCISCO, SEPTEMBER 1, 1919

Number 5

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"The records of the accident insurance companies show that the great majority of injuries to employes is due to the fact that the injured persons could not read the printed warning signs. There are eight and a half million workers in the United States who are in danger because they cannot read the English language. Brought within the reach of the printed word, these persons will be worth at least five dollars a week more to themselves and to the nation as workers, which increased earning power alone would provide \$2,000,000,000 a year more toward paying the interest on our war debt and help amortise it as well."

The interconnection soon to be established between the distribution systems of the San Joaquin Light & Power Corporation and the Pacific Gas & Electric Company from Gustine to Newman, California, will mark a new world's record in interconnection, making the entire network of power lines of the West into virtually one great distributive system. For extent of service and area of territory served, there is nothing in the world which rivals this latest western achievement.

Connections have for some time been arranged between the San Diego Consolidated Gas & Electric Company, farthest to the south, and the Southern California Edison Company, and between the Edison Company and the San Joaquin Light & Power. To the north, the Oregon and California systems have been connected through Copco and the California companies have all been exchanging power to ease over peak loads. The five miles of line now to be added will complete this connection and make an actual continuous transmission system from Mexico and from Yuma, Arizona, on the south to Medford, Oregon, on the north. With the bridging of two trifling gaps to the north, this connection would be extended clear to the Montana lines.

Of course, there is no actual transmission of power from a plant at one end of this great system to a consumer at the other end, but it is surprising how far the wave from an unusual demand will travel. For instance, it is a fact that the entrance of the Pacific fleet into San Diego harbor seriously taxed the plants of the San Joaquin Light & Power Corporation. It seems that during the summer months the San Diego Consolidated Gas and Electric Company have had about 6000 kilowatts of electrical energy to spare. This has been taken by the Southern California Edison Company, and the San Joaquin Light & Power Corporation in turn drew upon the Southern California Edison Company for a like amount. This saved running water to that extent from the Crane Valley reservoir. The day the fleet arrived in San Diego the city was crowded with visitors and the street car system, hotels and all users of electricity were called upon to give a maximum service. Therefore, the San Diego company had to keep all of its electricity at home, which meant that the Southern California Edison would not have 6000 kilowatts to give to the San Joaquin that day. The result was that the Crane Valley plants had to be put into action to make up the shortage. If the Pacific Gas & Electric Company had had spare energy to furnish over an interconnecting line, the demand might have been passed up the state until this unusual load was shared even by the power companies of Oregon. The practical value in increased elasticity of service as well as the spectacular element in the breaking of a world record is revealed in such an incident as this. The principle of interconnection is a happy instance of cooperation in which the way has largely been pointed by the West, and in which the West has achieved most important results.

Much interest is being shown by electrical public utility heads throughout the United States in the remarkable series of articles by S. M. Kennedy, general agent of the Southern California Edison Company, which are to appear shortly in the Journal of Electricity. Mr. Kennedy needs no introduction to the electrical industry. His life work in one of our greatest public utility organizations, and his clear-minded, constructive enthusiasm in analyzing and adjusting the problems of the industry have won recognition throughout the utility life of our nation.

**Mr. Kennedy's
Message to the
Public Utility**

The "man in the street" policy of public service, as outlined before the third annual convention of the Pacific Coast Section of the National Electric Light Association and published in the Journal of Electricity, has already permeated the industry with a new vision of utility service.

So helpful has this one article proved that Mr. Kennedy has responded to the insistent need for a complete handbook of public utility practice with a series of twelve inspiring articles, based on his lifetime of successful experience, and carrying to the utility executive, to his employe and to the "man in the street" a vision of the full possibilities of public utility service.

For the utility executive, Mr. Kennedy constructs a definite and specific policy governing personal relations both within and without the organization. He emphasizes for the utility employe the especial responsibility and opportunity of personal contact with the public. He presents a frank and convincing survey of the problems and the ideals regulating present day utility service which should reach every customer of every public utility company that is endeavoring to enlist the sympathetic cooperation of its public.

Millions of dollars are invested in patents in the United States. Patent rights form the basis of many of the great electrical organizations. Indeed, it may justly be said that upon the justice and intelligent enforcement of its patents depends the industrial and commercial success of this country.

With this in mind, the National Research Council recently appointed a committee of scientists and patent specialists to give careful thought to the American patent system and to suggest any improvements deemed advisable. This committee was made up of the following:

Dr. Wm. F. Durand, chairman; Dr. Leo H. Baekeland and M. T. Pupin, scientists and inventors; Dr. Reid Hunt, physician; Dr. S. W. Stratton and R. A. Millikan, scientists and Frederick P. Fish, Thomas Ewing and Edwin J. Prindle, patent attorneys.

The committee has made four definite recommendations which have since been embodied in bills introduced into Congress.

The first of these related to the institution of a single court of Patent Appeals to sit in Washington in place of the present nine courts, each of which is the court of last resort within its own circuit. It is believed that this higher court will do much to clarify patent law and by its successive decisions, do away with conflicting precedents which have arisen.

The second, and perhaps the most revolutionary of the recommendations is that of the severing of the Patent Office from the Department of the Interior and its formation into a distinct bureau so that its appropriations and other needs may be independently considered. A matter of such importance to the industrial welfare of the country should be decided purely on the basis of its merits and not in competition with the needs of other bureaus as must

necessarily be the case when its appropriation is included within that of a cabinet department. The present is a most convenient time for the segregation, as the proposed reorganization of the Department of the Interior into the Department of Public Works would leave the Patent Office without a sponsor.

In some sense as a corollary to this action, the committee has recommended an increase in the salaries of the examining corps, in order to encourage a higher type of technical assistance. A further suggestion makes provision for adequate compensation to the owner for past infringement.

These recommendations are made by a committee of exceptionally high standing from without the Patent Office and are believed to merit the encouragement in all possible ways of all interested in the betterment of our patent system.

A sign of the times is to be seen in the fact that several department stores in Western cities have recently enlarged their electrical departments, installing electric kitchens and laundries and featuring electric conveniences to the housewife in their newspaper advertising. This general recognition of electric ware as one of the accepted adjuncts of a home is evidence of the steady advance of the electric idea in the household of the average woman.

Although the department store in many respects is a formidable rival, the up-to-date retail electrical merchant should welcome this wider spreading of the electrical gospel. A report from an electric sign company shows that their business in one California city was substantially increased by the campaign carried on in that community by their competitors. The more washing machines and electric ranges are sold in a community, the more that community is ready to buy. Let the department store sell its customers. If the electrical contractor-dealer is giving a better service, as with most prosperous establishments is the case, he will cash in on the interest thus spread broadcast in the community. Trade is not to be arbitrarily diverted from any one channel to another—it finds the easiest outlet. All the electrical dealer has to do is through an attractive store and a skilled service to make his opening the easiest, and trade will naturally come to his door.

The water power bill has passed the House and is now awaiting ratification at the hands of the Senate. It is expected that the Senate bill which corresponds to that passed by the House will be reported promptly out of committee and given precedence over other matters involving more lengthy debate. It is to be hoped in justice to the power needs of the nation, which are no less acute than during the period of the war, that the Senate will make a special effort to this end. The failure of legislation which would encourage invest-

Proposed Changes in the Patent System

The Department Store in the Electrical Field

The Chances for Water Power Legislation

ment has been a factor in the power shortages of the last two years in the West.

The bill as it now stands provides for the creation of a Federal Power Commission to be composed of the Secretaries of War, of the Interior and of Agriculture, to which are given the powers relative to water power development hitherto handled by their various departments. The terms of the license provide for a period of grant not to exceed fifty years. Provisions are also made for the regulation of the rates to be charged to consumers by the grantees. Penalties are provided for entrance into combinations or monopolies in restraint of trade on the part of grantees. Suitable penalties are prescribed for the violation of the terms of the provisions of the act.

The bill is substantially that recommended a year ago and deserves prompt ratification.

A most thoroughgoing revision of every line of association activity has been proposed by the Development Committee of the A. I. E. E. Briefly, these changes involve:

Reorganizing the A. I. E. E.

1. An enlargement and popularization of the Proceedings.
2. More officers from a wider area, with fewer meetings.
3. Decentralization—the fostering of local sections; the holding of meetings elsewhere than in New York; the formation of a New York section.
4. The encouragement of younger members entering into activities.
5. The wider participation of the engineer in public affairs.
6. The federation with other engineering bodies, both locally and nationally.
7. The broader education of engineers, to be secured by a six-year college course.

These proposals are almost revolutionary in the breadth of reorganization they propose, but so nicely are they suited to the spirit of the association, that in regard to most of them very little has been heard except in their commendation. The decentralization of the national body and the fostering of local section development is but one phase of a general movement in this direction whose manifestations are to be seen in all national organizations. It is generally recognized that the engineer should take a more prominent part in public affairs and the federation of local engineering branches to present a stronger unit of influence is again merely a reflection of a principle already recognized.

The major exception to this general acceptance of the committee's report seems to be the change in the form of the Institute Proceedings. While it seems to be generally felt that there should be a broader policy as regards the matters of interest presented in addition to the technical papers, there has

developed a widespread protest against the transformation of the proceedings into merely another technical magazine. The attempt to extend the advertising columns is felt to be an unwarranted intrusion of the association into the field of the technical press with which they have no aspiration to compete. It is of course recognized that under no consideration should the technical standards of the present be lowered. Under some protest, but under the urge of a broader service, the technical press has gradually come to occupy a semi-popular field in which the severely scientific subject of special application plays only a limited part. Nevertheless these treatises have their legitimate and important place—when a man wishes to find up-to-date technical data on a given particular, it should be available. Most legitimately, the refuge of such papers has been their publication by engineering societies. As organs of the national engineering bodies, the association papers have an appropriate field in the maintenance of association unity and the uplifting of engineering standards through their columns, as well as the many personal services of an organization, but it must not be forgotten as well that the providing of an avenue for the presentation of technical advances is one of their important reasons for existence.

Announcement has come from the Northwest that the September convention of the Northwest Electric Light and Power Association has been postponed from September 10th, 11th and 12th and will be held in Seattle on September 24th to 27th. This change was made necessary by the visit of the fleet to Seattle during the earlier period and the consequent crowding of hotels which makes the securing of accommodations for a convention out of the question.

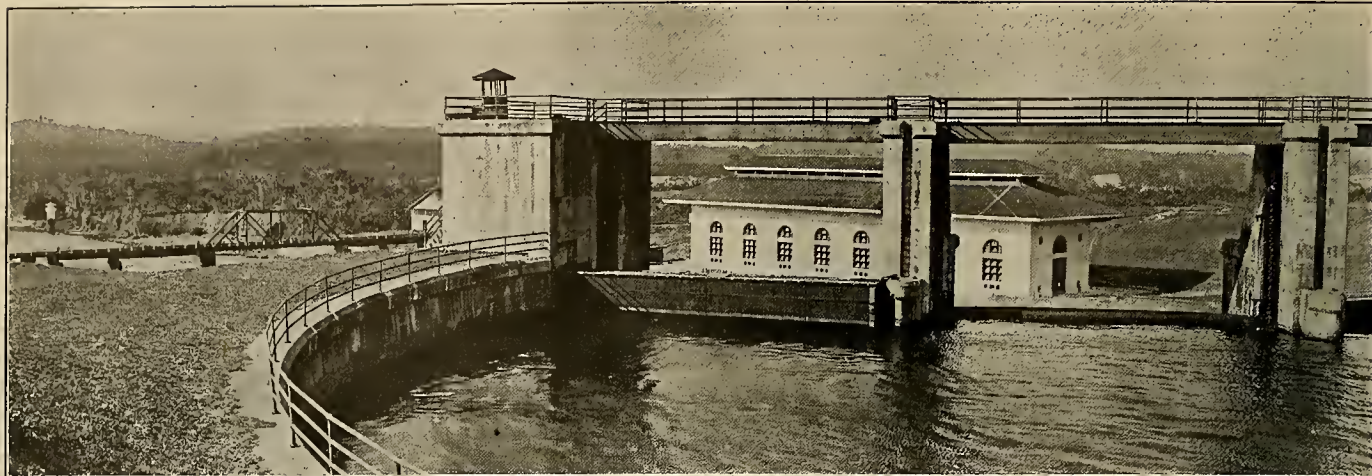
This modification in dates makes possible a wider attendance of electrical men from elsewhere on the Pacific Coast as it gives a longer period in which to make plans and adjust work for the fitting in of the northern trip. The inspiration of these meetings in the past has been one of the events of the electrical year in the West and a large attendance from California and the Southwest and Inter-mountain district is looked for.

All those intending to attend this gathering from the Pacific Central region are urged to report their names to this office. If enough delegates can be secured, it is planned to arrange for a special car from San Francisco under the auspices of the Journal of Electricity.

NEW JOURNAL SERVICE: An account of the original experiment in Customer-Ownership as conducted by the Pacific Gas & Electric Company in 1914 and a survey of the extent to which this principle has permeated central station financing will be the feature of the September 15th issue of the Journal of Electricity. Merchandising and power plant records of the Northwest will also be presented in this number.

A special washing machine and vacuum cleaner edition is planned for October 1st. If you have recently carried out a successful campaign along these lines, let the rest of the industry know about it through this number of the Journal of Electricity.

Attention is called to the announcement of a Pan-Pacific Number for November 1st which appears in the advertising pages elsewhere in this issue. Advertising reservations for this issue, which is to reach the principal electrical purchasers of the entire Pacific area, should be received by September 15th and advertising copy by October 1st.



HYDROELECTRIC PLANT AT GATUN SPILLWAY

The plant has several times been enlarged to meet the growing demands of the canal zone. The new building is planned to house 3 new units which will bring the ultimate capacity of the plant to 22,140 kw.

Development of the Gatun Hydroelectric Station

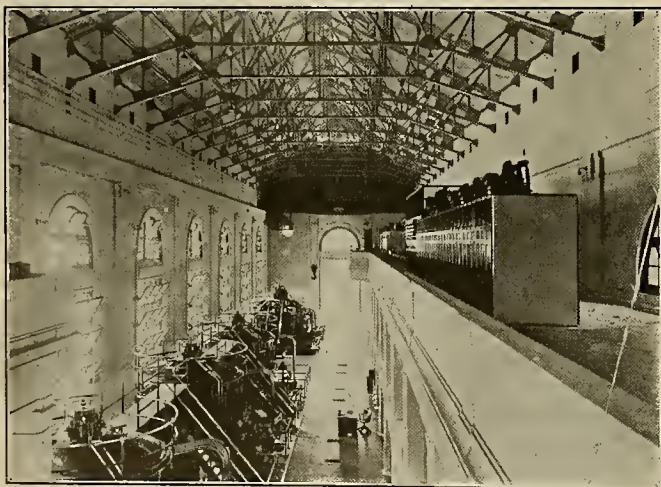
(The details of the recent improvements in the power plant which furnishes power for the operation of the Canal. These extensive changes were made without interruption of service and the story of their accomplishment is one of especial interest. The Pelton installation at the new plant has already broken a record in water wheel operation through the attainment of a 95.4 efficiency. The data here presented formed part of the official government report on progress at this station.—The Editor.)

In the original construction of the hydroelectric station at Gatun spillway, the capacity of the generators installed was 6,000 kilowatts. Provision of penstocks was made for the installation of three future units aggregating an additional 6,000 kw. which would double the plant, giving a proposed capacity of 12,000 kw. Through the increase in consumption of electric power along the Canal it has been necessary to increase the capacity of the plant beyond the original maximum estimate. The plant

time, in the operating or bus voltage, which was raised from 2,200 to 6,600 volts for transmission to the substation at Gatun and subsequent distribution, at 44,000 volts, to the other substations of the transmission system. The voltage from the three original generators was raised by the installation of auto-transformers while the new unit generates directly at the 6,600-volt station potential. The switching gear and connections were revised as necessary in connection with the increase of voltage.

The station was first placed in service during July, 1914; and in January, 1915, after completion of the transmission lines, the entire load on the power system was transferred to this plant.

The original capacity of this station as designed and installed was 6,000 kw., divided into three units of 2,000 kw. each. Shortly after the station had



INTERIOR OF THE GATUN PLANT

The generators installed looking down from the balcony. The remarkable feat of remodeling the entire plant was accomplished without interruption of service.

has now a capacity of 13,140 kw., and provisions have been made for the future installation of two more units of 4,500 kw. each, giving an ultimate capacity of 22,140 kw.

The developments were made while the plant was in use and with no interruptions of the service. An interesting feature was the change, at the same

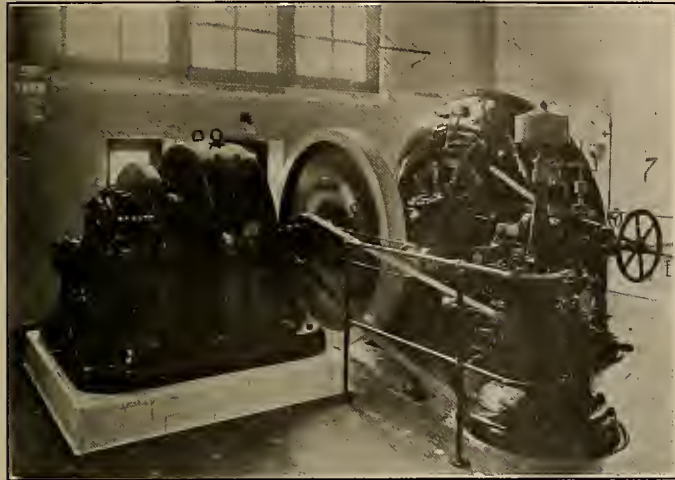


HIGH TENSION BUS

An interesting feature in the increase of the plant capacity was the change in the bus voltage which was raised from 2200 to 6600 volts for transmission to the Gatun substation and 44000 volts to other stations.

been placed in service the load on the power system during certain periods reached such a stage that the steam station at Miraflores had to be used to help carry the load. During this interval, studies were being made toward increasing the capacity of the hydroelectric station to handle this additional load.

The first work accomplished along these lines was done during the latter part of 1916. The original water wheels in turbines were taken out and



EXCITER No. 6

Additional exciter capacity was gained by the addition of a 275-kw. turbine driven exciter supplied with water from a 40-in. connection to two of the 12-ft. penstocks.

replaced with wheels of a different design and slightly increased size; a certain section of the turbine casing being bored out to allow the larger size wheel to be used. This change in size and design of water wheels in the three original units increased the capacity of the latter from 2,000 kw. to 2,880 kw. each, and the capacity of the station as a whole from 6,000 kw. to 8,640 kw., a total of 2,640 kw., or 44 per cent.

Further studies of load conditions on the power system clearly indicated that the above changes would relieve the situation only temporarily. Preliminary plans were started for making extensions to the station that would not only provide for the immediate requirements of the system but would also take care of future increased load. When the original station was designed, certain provisions were made for the future installation of three additional units of the same size as the original ones. By enlarging the station along the lines originally planned, the maximum capacity of the completed project would be 17,280 kw. The completed studies of the power situation showed that the limit of capacity of station, if enlarged only to the extent of the original plans (i. e., 17,280 kw.), would be reached and possibly exceeded in a short time. These studies resulted in the making of plans that would allow the maximum capacity to be developed in this station, consistent with general plans and details of original installation.

Final Plan

The principal factors limiting the size of units to be installed in this new extension were building limitations and the size of the head gate structure, which had been built to accommodate future units

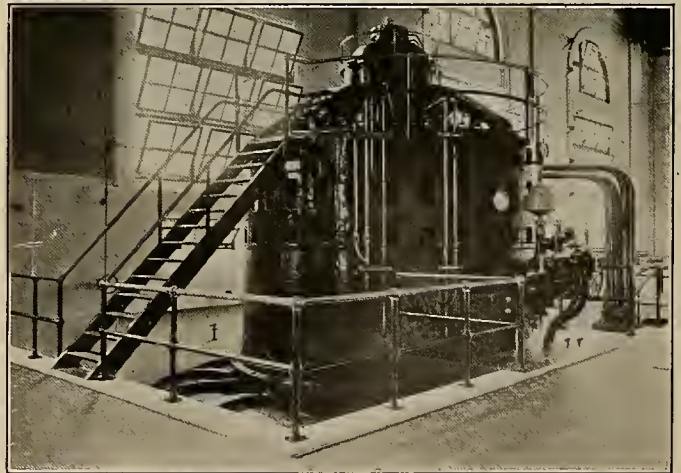
the same size as those originally installed. However, the final study of all details proved that the extension of this station could be made by the installation of three units of 4,500-kw. capacity each, which would increase the ultimate capacity of the station from 17,280 kw. to 22,140 kw.

Detailed plans were made and the final extension of station, in so far as size of units and ultimate capacity of station were concerned, was carried out as indicated above. The requirements of the power system did not call for the complete installation of all three units at this time, and the installation of only one of the 4,500-kw. units was accomplished.

The actual work on this extension was started in December, 1916. The west end of the main building was demolished and excavation for the foundation of the new structure was started. The building extension was carried out along general lines similar to those of the original structure, some minor details in connection with interior dimensions of the building being modified to allow for increased size of new units and changes in layout of switch gear.

In order to change from the plans as originally made for the extension of this station, certain changes and modifications had to be made in the original equipment and general layout of the station. A brief outline of each of these changes, under its respective heading, follows:

Foundations.—The foundations for larger size units in the new section of the building are practically the same as in the original station. Recesses



ONE OF THE GENERATOR UNITS

The station has been in satisfactory operation since the completion of changes in November, 1918.

were made in the main building wall to accommodate the increased size of the spiral casing of the turbine.

Draft tubes.—The draft tubes of the original turbines were of steel imbedded in the concrete foundation. The draft tubes of the new units were made of concrete and made an integral part of the foundation structure.

Tail-race.—On account of the increased volume of water discharged through the larger size units, changes had to be made in the design of the tail-race. The old structure, which was made up of six small arched openings in the spillway wall, was demolished and replaced with one single arched opening; this

eliminated the necessity of intervening piers, which had obstructed the discharge of water from the turbines and decreased the effective head.

Headgates and penstocks.—The penstocks supplying water to the original units are 10 feet 6 inches in diameter, with headgate valve of the same dimension. On account of original work that had been done on the headgate structure, the size of the headgate valves and about 25 feet of penstock for the larger units were limited to that size. This diameter of penstock (10 feet, 6 inches) was increased to 12 feet just outside the gate house and was continued to a point where it was reduced for connection to the spiral casing of the turbine. The headgate and penstock installations were completed for all three units. A 40-inch connection was made to two of the 12-foot penstocks just outside the main building for supplying water to the turbine-driven exciter of 275-kw. capacity.

Main units.—The original units in this station developed 2,880 kw., operated at 2,200 volts, and ran at a speed of 250 r.p.m. Each unit had an exciter mounted on the main shaft. The oil pressure required for operation of the governor was 80 pounds. The new units, as installed, developed 4,500 kw., operated at 6,600 volts, and ran at 187.5 r.p.m. The oil pressure required to operate the governor is 150 pounds. No exciters were mounted on the shafts of these new units.

In order to adapt the oil-pressure system to both sets of governors, the original oil pumps were replaced with new ones that would handle oil against the higher pressure required for the governors on the new units. The old governors were originally designed to operate satisfactorily at this higher pressure. Tests were conducted to check up this latter detail.

These oil pumps, as originally installed, were equipped with alternating current motor drive. When the change in pumps was made, the type of motor was also changed. These oil pump motors now operate on direct current. This change in type of motor drive improved certain operating characteristics of the station. Changes were also made in the type of governor drive on old units to conform to that on new units. With the exception of minor mechanical details and increased capacity, the new units are of practically the same general design as the old ones.

Turbine-driven exciter.—The excitation current for the original station was furnished by two 100-kw. induction motor-driven exciters, and three 50-kw. exciters mounted on the shafts of the main units. The motor-driven exciters were used for normal operation, and the shaft-driven ones for emergency use in case of complete shut-down of the station or other causes.

Additional exciter capacity had to be provided for the increased capacity of the station. This was accomplished by the installation of a 275-kw. turbine-driven exciter. This is a unit complete in itself and supplied with water from a 40-inch connection to two of the 12-foot penstocks. Valves were installed so that the unit can be supplied with water from either

main penstock. The installation of this unit provides a main source of excitation for the station that is complete in itself and can not be affected by any other trouble that might develop in the station.

Control board.—The extension of the control board was carried out along lines similar to those of the original equipment. One exciter panel and three generator control panels were installed. The rheostat equipment on the old section of the board was rearranged and other changes of detail were made to conform to the new section of the board. Voltage regulator equipment was rebuilt, and adapted to the new equipment. Advantage was taken of the opportunity offered while this work was being done to make changes in minor details of the control board which improved the general operating characteristics of the station.

Switch gear and station bus.—This station was originally designed and operated at 2,200 volts, all the switch gear and bus equipment being standard for that operating voltage. Changing the station over to the increased bus or operating voltage of 6,600, required practically the complete reconstruction of all this equipment.

Auto-transformers were installed in the basement storeroom, and generator leads were connected direct to the same. These transformers increased the voltage of the old units to 6,600 volts, and for all practical purposes can be considered as an added part to the old generators, as no provision was made for future operation of these machines without the auto-transformers. The 6,600-volt leads from transformers were carried to the station bus through main and auxiliary bus switches. Changes were made to the old 2,200-volt bus and the structure was extended on through the new section of the building. The 2,200-volt outgoing feeder equipment was formerly located in the old section of the building. In making these changes, the outgoing 6,600-volt feeder equipment was installed in the new section of the building. This new 6,600-volt equipment being of an entirely different type, it was necessary to construct a complete set of new type switch compartments, and slightly different bus layout; the old 2,200-volt outgoing feeder equipment being completely removed and diverted to other uses in the substations.

The reconstructing of switch gear and bus layout in this station was the most difficult detail to accomplish as the station had to be kept in continuous service while work was going on. Another factor that still further complicated the problem as a whole was that the raising of bus-voltage at the hydroelectric station necessitated corresponding changes being made at the Gatun substation, where power from the generating station is fed into the 44,000-volt transmission system. The work at the hydro station and at the substation had to be carried forward together so that the final change-over from 2,200 to 6,600 volts could be effected without interruption in service on any part of the power system.

Changes at Substation

The work at the Gatun substation which had to be done on account of these changes was the rearrangement of switch gear, installation of new type,

feeder equipment for incoming 6,600-volt feeders, and installation of 2,200-volt bus with power transformer equipment for handling local distribution of power from the main 6,600-volt bus. This included the power distribution to Gatun Locks, which had formerly been supplied direct from the 2,200-volt station bus at the hydro station. A new 8,400-kw., 6,600/44,000-volt transformer was installed at the hydro station and the two original 4,000-kw. transformers that had been operating on the 2,000-volt bus were reconnected and placed in service at 6,600 volts. This work as a whole necessitated many changes in the general layout and details of this substation.

The Shift in Voltage

The actual change over from 2,200-volt bus voltage at the hydro station to that of 6,600 volts was accomplished without interruption in service on any part of the power system. This was done by carrying the work out in what might be called two stages. The first was the completion of the 6,600-volt bus structure and feeder equipment in both hydro and substation, and the installation of the new generating unit and 8,000-kw. transformer in the substation. When this work was completed the new generating unit was given a preliminary test by picking up the Balboa dry dock pump load through an 8,400-kw. transformer and over the spare transmission line. This load was carried for several hours, and final adjustments were made on the new equipment. The new unit was then tied into the power system and operated in parallel with the old 2,200-volt generators through the 44,000-volt bus in Gatun substation. The station was then operated with this lineup for about a week in order to make necessary adjustments to the new equipment. When the satisfactory operation of this new equipment was assured, work was then started on changing over the old 2,200-volt generators, so that they could operate in parallel with the new unit of the 6,600-volt bus.

The changing over of old units was the second, or final stage of this work. One unit at a time was taken out of service. The generator leads were opened up and brought through the auto-transformer to the isolated section of the main bus which was being reconstructed for 6,600-volt service. The old 2,200-volt generator switching equipment had to be replaced with equipment of a different type, which necessitated demolishing the old concrete switch cells and replacing them with new ones of a different design in the same location. The two switch cells and the instrument transformer compartment for each unit were built several months in advance and the greater part of the preliminary work was done. When the old switch structure was demolished this new structure was set in place by an overhead crane, leveled up, and the switches were installed. This method eliminated the time required to build intricate wooded forms, and the setting of concrete after being poured. After the erection of switches and bus structure of each unit was completed, final connection of its section of bus was made to the new 6,600-volt section, and the old unit was placed in parallel on this bus with the new unit. In the mean-

time the work at the Gatun substation was carried on and changes were made in accordance with the status of work at the hydro station.

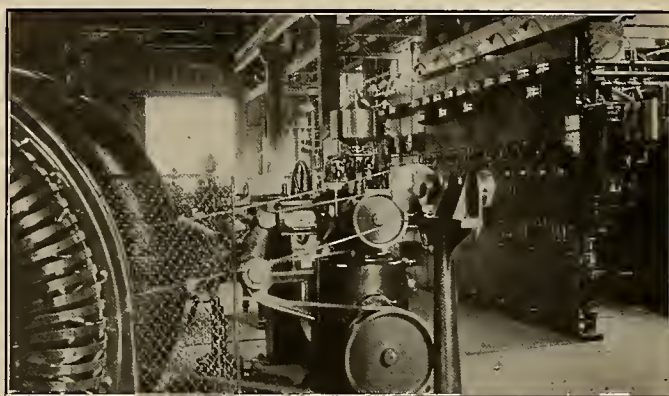
The work as a whole was completed during November, 1918. With the exception of minor adjustments to equipment, the station has been in satisfactory operation ever since.

THE TEMPORARY POWER PLANT AT HETCH HETCHY

BY RUDOLPH W. VAN NORDEN

(Recent developments in the Hetch Hetchy project have focused attention on the development of power. Several main power stations will form parts of the completed system, but as yet the only power actually developed is that at the temporary station at Early Intake here described. The author of this brief description was at one time connected with the city engineer's office at San Francisco and is intimately familiar with the work—The Editor.)

In the spring of 1917, work was commenced on a temporary power plant for the Hetch Hetchy system, located just below the Early Intake. This plant, which is for the purpose of furnishing power for construction work at all points in the mountain



Interior view of the temporary power plant in Hetch Hetchy. The plant is equipped with three generating units of 800 kva. each.

section of the San Francisco water and power project, is equipped with three generating units of 800 kva. each, and a total output of 2750 hp. The generator current is stepped up to 22,000 volts, for transmission to the points of use. A diversion, consisting of a low concrete dam, was made in Cherry Creek about 2.5 miles above its junction with the Tuolumne, and a conduit 3.5 miles long following the east bank of the Cherry and then the north bank of the Tuolumne, was built. This conduit has 4400 ft. in tunnels and 1.4 miles of concrete lined canal, and 1.3 miles of timber flume. A 42-in. riveted steel penstock, 530 ft. long, branching into three 28-in. pipes, which reduce to 24 in. at the turbines, supplies water to the three units. The head, including draft of the turbines, is 346.5 ft. Francis type turbines, built by the Pelton Water Wheel Company, are installed, Pelton governors, General Electric generators and four 1000-kva. Westinghouse raising transformers. The power house building is of timber frame construction, sheathed with asbestos covered corrugated iron. This is a temporary installation but substantially constructed. It was placed in operation in the spring of 1918.

California 220,000-v.--1100-mi.--1,500,000 kw. Transmission Bus

BY R. W. SORENSON, H. H. COX AND G. E. ARMSTRONG

(Interconnection between the lines of the Pacific Gas & Electric Company and the San Joaquin Light & Power Company is significant of the movement towards general interconnection which is actively afoot in the West. The present water shortage and the need for conservation of fuel make the following state-wide plan for more efficient power-distribution one of immediate practical importance. The authors are respectively, Professor of Electrical Engineering at Throop College of Technology, Station Chief of Eagle Rock Station and member of the Department of Generation, Southern California Edison Company. This paper is one of the important contributions to be offered at the Pacific Coast A. I. E. E. convention of Sept. 17-19, at Los Angeles, Cal.—The Editor.)

Fuels, particularly oil, must soon be used for isolated power only in places where electric power is not available, as in the propelling of air and ocean craft. In large power systems, especially in the West, the use must be limited to standby service, for peak loads, low water periods, and other emergencies.

Power Resources

California has available ample hydro-electric power to supply the industrial and agricultural demand for many years.

The data for the tables given here of resources and loads, of the northern part of the state, is taken from the various reports which have been published, and no attempt has been made to verify it.

Load Demand

The best available information indicates a demand in 1926 approximately as shown in Table II.

TABLE II

1. Sacramento Valley, northern portion.....	70,000 kw.
2. Truckee River electrification.....	40,000 "
3. Sacramento Valley, southern portion.....	125,000 "
4. San Francisco Bay district.....	250,000 "
5. Fresno district	90,000 "
6. Bakersfield district, including Tehachapi elec- trification	125,000 "
7. Los Angeles district	300,000 "
8. Barstow and Needles district, including rail- road electrification	40,000 "

Making a total of..... 1,040,000 kw.

In order to carry this load, approximately 500,-000 kw. additional in hydroelectric capacity will be required.

A demand for power such as is shown in Table II can be supplied most economically by power developed in large units. Large power units require transmission lines of the highest possible economic voltage.

*It has been shown that for long transmission 220,000 volts is economical under conditions which require a much more expensive construction than has proven adequate for the 150,000-volt lines of the Southern California Edison Company.

California Transmission Bus

On this basis a plan as shown on the map of Figure 1 is proposed. In this plan the interconnection of all the California power companies has been assumed, as an economic necessity for its best utilization. Interconnections of limited capacity are not entirely satisfactory because they fail just at the time they are needed most to transfer from one system to another large blocks of power.

The plan of the proposed scheme involves the construction of a two-circuit transmission system extending from Pit River to Los Angeles, a distance of 570 miles. Branch lines of like voltage connect the three other power projects and the San Francisco load center to this main line on which the other load centers are located. The main line thus becomes a high tension bus extending nearly the entire length of the state, hence its name: California Transmission Bus. This arrangement makes possible unlimited interconnection and exchange between all the power companies of the state.



Map showing the proposed transmission system based on an interconnection of all the California power companies, and extending for a distance of 570 miles.

Small developments aggregating 325,000 kw. have been completed and many others of this type are available. There are also four large projects as indicated in Table I which can be readily developed to a capacity of 1,500,000 kw. in the near future.

TABLE I

Large Power Resources			
	New Developed and Under Construction	Proposed Developments 1926	Reasonable Future Development (not ultimate capacity)
	Kw.	Kw.	Kw.
Pit River	None	200,000	500,000
Feather River	100,000	200,000	300,000
Colorado River	None	None	200,000
Big Creek	100,000	300,000	500,000
Total,	200,000	700,000	1,500,000

Total 1926 hydroelectric power development including small projects, 1,025,000 kw.

*Silver—"Problems of 220-kv. Power Transmission," A. I. E. E. Proceedings, June, 1919.

Substations have been located at Marysville, Stockton, San Francisco, Fresno, Bakersfield, and Los Angeles. These points are natural load centers and suitable points for connecting with the present power systems. On the Colorado River branch, the construction of which is dependent upon the electrification of the transcontinental railroads, substations would probably be located at Barstow and Needles. The substations divide the lines into sections of suitable length for practical operation, the longest section being 150 miles, as shown in Table III.

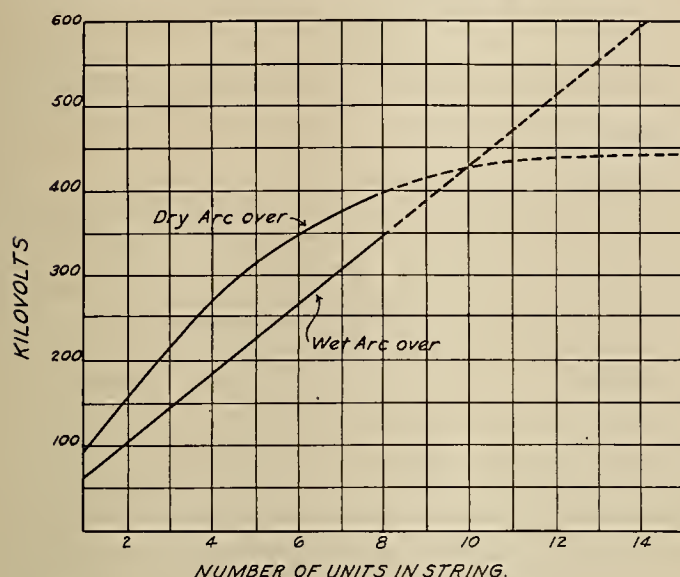


FIG. 2. TYPICAL 60 CYCLE ARC-OVER CHARACTERISTICS.
SUSPENSION INSULATORS.

These curves show no practical gain in dry arc-over voltage for strings of more than ten units

TABLE III

Pit River to Marysville.....	150 miles
Feather River to Marysville.....	60 "
Marysville to Stockton.....	90 "
Stockton to San Francisco.....	60 "
Stockton to Fresno.....	130 "
Big Creek to Fresno.....	40 "
Fresno to Bakersfield.....	100 "
Bakersfield to Los Angeles.....	100 "

Bakersfield to Barstow.....	110 "
Barstow to Needles.....	150 "
Needles to Colorado River.....	100 "
Colorado River to Phoenix.....	100 "

Pit River to San Francisco.....	300 miles
Big Creek to Los Angeles.....	240 "
Big Creek to San Francisco.....	230 "

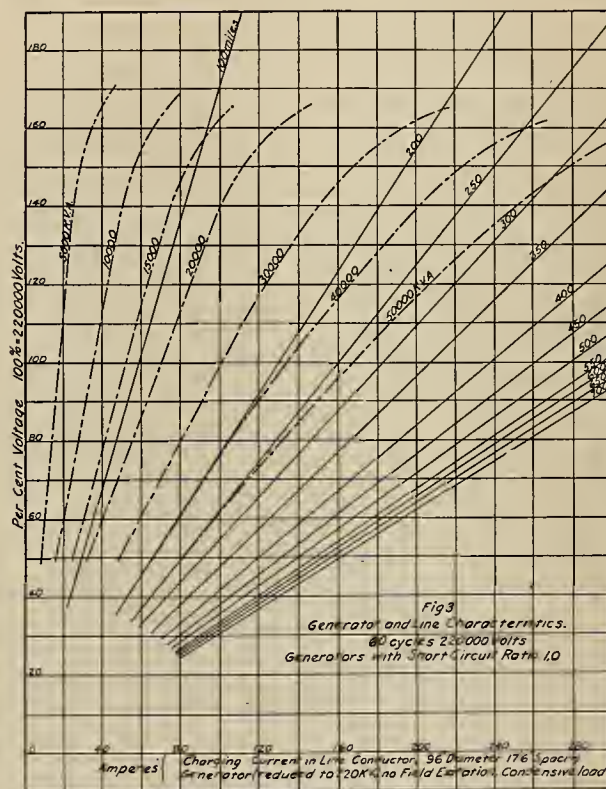
The Transmission Line

The standard frequency, 60 cycles, has been assumed on the basis that the Southern California power systems operating at 50 cycles will ultimately find it advantageous to conform to the A. I. E. E. standard. In the natural growth of the load as shown in Table II, 70 per cent of the 1926 load will be supplied by the 60 cycle systems. Interconnection of such large load centers or power sources through frequency changers, limits the exchange of power, is uneconomical, and increases tremendously the required operating vigilance.

The practicability of the high voltage line has been well demonstrated by over five years of remarkably successful operation of the 150,000-volt lines of the Southern California Edison Company, which, during this period, have delivered from the Big Creek power houses over the 240-mile lines to the

Los Angeles distribution systems, 1,200,000,000 kw-hrs. at an average efficiency of 87.5 per cent with a 45 per cent load factor. During this period there have been no interruptions for which the high voltage is responsible, and on the contrary, the system has been free from disturbance and interruption to a greater degree than the lower voltage lines in the same locality.

The present Big Creek lines can be operated at 220,000 volts, 60 cycles, without material change, and this is proposed as a link of the transmission bus, and its operation under these conditions will be analyzed and applied to conditions of the proposed system.



With 50,000 kva. of generating capacity connected to a line of 250 miles the line can be charged without losing control of the voltage with generators with a short circuit ratio of 1.0.

Analysis of Big Creek System

Corona —

As now operated at 150,000 volts and 50 cycles, the voltage is only 80 per cent of the lowest critical voltage of any part of the line and there is no corona loss. At 220,000 volts, 60 cycles, corona loss occurs to some extent on the entire line but amounts to but 0.4 per cent of the line capacity during fair weather. With storm conditions over the entire line, and with an assumed reduction of 20 per cent in the critical voltage, the corona loss would be 8 per cent of the line capacity. This loss is not sufficient to make the line inoperative and would occur too rarely to be an economic factor.

Insulation —

The Big Creek 159,000-volt lines have nine units in each suspension string and two eleven-unit strings in parallel on dead ends. During the five and one-half years of operation only two insulator string failures have occurred. Both of these were during normal conditions of operation without any apparent cause, other than that of being in a location where the insulators have been found to have a relatively high rate of deterioration.

The Big Creek line towers allow sufficient clearance to permit the lengthening of the nine unit suspension strings to eleven units, and to any desired number of units at dead ends. Table IV shows safety factors for insulator strings, wet and dry.

TABLE IV					
Safety Factors for Insulator Strings					
		Wet arc-over		Dry arc-over	
		9 Unit	11 Unit	9 Unit	11 Unit
		String	String	String	String
(87 kv. to ground)	150 kv.....	4.3		4.8	
(127 kv. to ground)	220 kv.....		3.7	3.3	3.4

The Big Creek line operated at 220,000 volts is at the critical corona voltage and any disturbances resulting in a higher voltage will quickly expend their energy in producing corona loss, which will permit a smaller safety factor to be used.

Charging Current —
Long high voltage lines cannot be operated without synchronous condensers at the receiving station to regulate the voltage, and as a consequence the charging current, even at the standard 60-cycle frequency, becomes a factor of no great importance as long as these synchronous condensers are connected to the line.

Without these condensers the line charging current must be furnished entirely by the generators, in which case the generators may become greatly overloaded and at the same time produce a very high voltage over which the operator has no control. To avoid this emergency a transmission line with its generators, transformers, and synchronous condenser must be considered as a unit and as such should be securely coupled together electrically at all times. This has been proven practical in the case of the Big Creek system in which it is possible to start the 15,000-kva. condensers and bring them up to speed with the generators.

Line Capacity —
The Big Creek lines as operated at 150,000 volts with 30,000-kva. condenser capacity per line at the receiver end are each good for 57,500 kw. at 85 per cent power factor, and will have under these conditions a line drop of eleven per cent. Operated at 220,000 volts these lines should each have a capacity of 125,000 kw. with an equal line drop when provided with the proper condenser capacity, which is approximately 75 per cent of the line capacity in kilowatts.

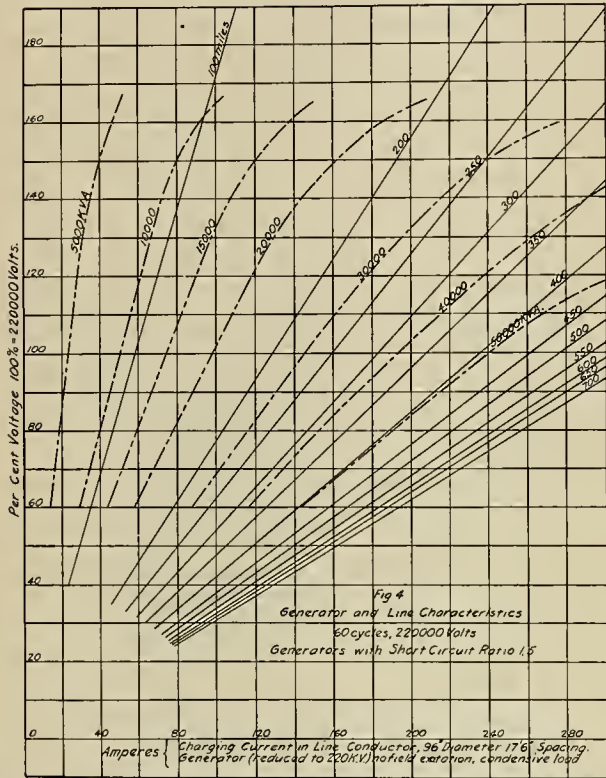
This is a fair indication of the conditions which will exist in the proposed system, the load centers of which are so distributed as to limit the actual average distance of transmission to about 200 miles. The economic gain in doubling the capacity of lines which cost approximately \$6,000,000, the present cost of which would be at least 30 per cent more, would more than offset the cost of all necessary changes, including the adoption of the standard frequency.

Mechanical —
The type of construction used on the Big Creek line has proven entirely adequate for California conditions. There have been only three mechanical failures, all of which occurred shortly after the line went into service and were all due to defective line hardware. In one case the failure was due to faulty design. This fault was entirely corrected by re-designing the cable clamp so as to grip the steel core independently of the aluminum conductor. The other two were due to individual defects in parts. There have been no tower failures, and no tower maintenance whatever has been required. Approximately twenty per cent of the Big Creek line is subject to ice and snow conditions, parts of it reaching altitudes of 5000 feet. Similar conditions exist over practically the entire proposed 220,000-volt system.

Operation —
The most interesting feature of the operation of the Big Creek system is its reliability, which has been equal to that of steam plants of similar capacity located near load centers. Flashovers have caused only momentary interruptions and have in no case resulted in damage such as to prevent immediate resumption of service. During the greater part of the time the power has been carried over a single line for a large part of the distance.

The operating history of the Big Creek system discloses no evidence of any trouble due to the high voltage of the system, and in addition has demonstrated that higher voltages may be used with equal or greater reliability. The Big Creek 17,500-kva. generators have operated at 60 cycles satisfactorily and delivered full output at this frequency.

High tension line switching and synchronizing has been carried on consistently throughout the operation of the Big Creek system without trouble, and should be possible on the 220,000-volt system. During times of switching slight dis-



The point of intersection of the generator curves with the line charging current curve for any particular line determines the voltage to which the generator will build up when connected to that length of line with no field excitation.

Figure 2, curves showing arc-over voltage as reproduced from Mr. Silver's paper, "Problems of 220-kv. Power Transmission," show no practical gain in dry arc-over voltage for strings of more than ten units and with these facts in view, it is proposed that for operating the Big Creek line at 220,000 volts, suspension strings have 11 units and dead end strings 12 units in series. Insulator testing crews have several times reported four and five defective units in a nine-unit suspension string, without any indication of trouble. The only apparent value of a longer string than that proposed would be a decreased probability of sufficient defective units in a string to cause breakdown. Developments of methods of grading insulator units and shielding insulator strings will, in all probability, materially change curves of Figure 2.

Present day methods of insulator testing and maintenance would probably have prevented the two failures which have occurred on the Big Creek lines as previously mentioned. These methods applied to the lines operating at 220,000 volts, and the use of the better types of insulators now available, will insure successful operation.

charges, never followed by any energy current, occur on the arresters. Operating at corona voltage rather than at 80 per cent of the critical voltage, it may be possible to absorb these disturbances without arresters.

Complete parallel operation of all lines must be adhered to in the proposed system. Satisfactory protective relay systems for dropping defective sections with little disturbance have been developed for present parallel transmission lines and there appear to be no obstacles to extending these to the higher voltages.

Generators*—

Curves of Figures 3 and 4 show generator and line characteristics for 60-cycle, 220,000-volt systems. The full lines are the charging currents in amperes for different lengths of line plotted against per cent normal voltage. The broken lines are generator characteristics of various sizes of generators when connected to condensive loads with no field excitation. The point of intersection of the generator curves with the line charging current curve for any particular length of line determines the voltage to which the generator will build up when connected to that length of line with no field excitation. Figure 3 is for generators with a short circuit ratio of 1.0 while Figure 4 is for those with a ratio of 1.5.

Figure 3 shows that with 50,000 kva. of generating capacity connected to a line of 250 miles, the line can be charged without losing control of the voltage with generators of this design. By having synchronous condensers connected to the line at the receiving station generators of this capacity will bring up any length of line necessary to the successful operation of the proposed system. Those curves show that generators for such a system should be designed with the highest short circuit ratio that other conditions will permit, in order to reduce to a minimum the tendency to become self-exciting.

Comparative Data—

	Big Creek Lines at 150-kv.	220-kv. Lines as proposed by Silver
Aluminum Steel Cable		
Diameter .....	.95 in.	1.036 in.
Circular mils	683000	808900
Weight per foot.....	.75 lb.	.90 lb.
Length of average span.....	750 ft.	800 ft.
Weight of towers without footings		
Suspension	4300	9000 to 14000
Anchor	6450	24000
Stringing tension at 80° F.		
No ice allowance.....	4740	
Ice allowance	3130	
Maximum tension allowed....	8500	17300
Insulator strings to carry load		
Suspension	1	2 and 3
Anchor	2	6

For further data regarding the Big Creek line refer to the paper, "150,000 Transmission System," by Woodbury, A. I. E. E. Trans., 1914.

Immediate Action Needed

Such a system as proposed is needed immediately; all engineering fundamentals essential to a solution of its problems are well understood, and the Big Creek system can be used as a part of the project without material reconstruction.

To supply this need, arrangements should be made without delay for a complete working out of all details of the proposed system, as otherwise in the future it may be necessary to do a large amount of reconstruction to bring together individually designed systems, which is never a wholly satisfactory procedure.

*Data for these curves was worked out in the laboratory of Throop College of Technology in 1915 and results verified by actual tests on the 17,500-kva. generators at Big Creek. For further data and explanation of generator performance with large condensive loads, see Newbury Electric Journal, 1918.

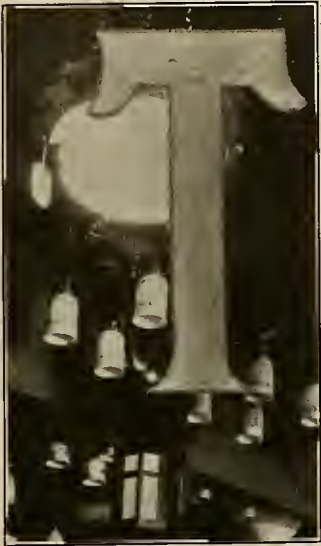
HELPFUL SUGGESTIONS FOR TECHNICAL WRITERS

In order to avoid confusion in the use of abbreviations in technical writing the following suggestions for standardization are given, as illustrating the practice of the Journal of Electricity. These excellent suggestions are compiled with certain modifications from requirements of the meetings and papers committee and of the editing committee of the American Institute of Electrical Engineers. They are now practically universally recognized as standards of good practice for technical writers.

Name	Abbreviation
Alternating current	spell out, or a.c. when used as compound adjective
Amperes	spell out
British thermal units	B.t.u.
Candle power	c.p.
Centigrade	cent.
Centimeters	cm.
Circular mils	cir. mils
Counter electromotive force	counter e.m.f.
Cubic	cu.
Diameter	spell out
Direct current	spell out, or d.c. when used as compound adjective.
Electromotive force	e.m.f.
Fahrenheit	Fahr.
Feet	ft.
Foot-pounds	ft-lb.
Gallons	gal.
Grains	gr.
Grams	g.
Gram-calories	g-cal.
High-pressure cylinder	spell out
Horsepower	hp.
Horsepower years	hp-yr.
Hours	hr.
Inches	in.
Kilogram	kg.
Kilogram-meters	kg-m.
Kilogram-calories	kg.cal.
Kilometers	km.
Kilovolts	kv.
Kilovolt-amperes	kva.
Kilowatts	kw.
Kilowatt-hours	kw-hr.
Kilowatt-years	kw-yr.
Magnetomotive force	m.m.f.
Mean effective pressure	spell out
Miles	mi.
Miles per hour per second	mi. per hr. per sec.
Millimeters	mm.
Milligrams	mg.
Minutes	min.
Meters	m.
Meter-kilograms	m-kg.
Microfarad	spell out
Ohms	spell out
Per	spell out
Percentage	per cent, (or % in tabular matter)
Pounds	lb.
Power factor	spell out
Revolutions per minute	rev. per min. (or r.p.m. in tabular matter)
Seconds	sec.
Square	sq.
Square-root-of-mean-square	effective, or r.m.s.
Ton-mile	spell out
Tons	spell out
Volts	spell out
Volt-amperes	spell out
Watts	spell out
Watt-hours	watt-hr.
Watts per candle power	watts per c.p.
Yards	yd.

Distinction and System in the Retail Business

(Remarkably pleasing effects in store arrangement are often achieved by very simple devices, such as the mirrors and curtains described below. In addition to distinctive arrangement, the owner of this enterprising store advocates careful and detailed handling of all labor and material expenses, on the theory that methodical organization is one of the essentials of success in electrical retailing.—The Editor.)



Ceiling arrangement showing fixtures set off against short green burlap curtains.

the room. These not only increase the effective size but add to the illumination.

Moreover, a customer examining a fixture close at hand is afforded a distance view at the same time by the reflection in the mirrors.

Immediately upon entering the display room the visitor becomes aware of a certain spaciousness and individuality. There is no sign of that crowded mass of metal and glass which is so often seen in the electrical retailer's store. The effect of roominess is maintained by the simple expedient of green burlap screens dropped from the ceiling at intervals between the fixtures. These provide an effective background which displays each fixture to its best advantage.

Listing Material —

Have you ever heard a conversation of this kind between a contractor and his wireman?—

“John, you finished up that job for Smith’s Cafe, didn’t you?”

“Yes, I finished that day before yesterday.”

“Well, I wish you’d turn in the list of material to the bookkeeper. This is the third of the month and the bills should have been sent out already.”

So John makes out the list, holding up Anderson’s rush order and using time which will later be charged to Anderson.

The easiest time to list material used is when it is taken from the shop. To insure its being listed at this time, the following system is used by the Silver State Electric Company:

The Original Entry Form is made out in duplicate, and is serially numbered; thus each job has a number. The original contains an estimate of the job, and goes to the shop to be used for shop record.

HAT there is a right way and a wrong way of doing things, and that it pays to do things right, is the belief of R. S. Willoughby of the Silver State Electric Company, Denver, Colo. Ample evidence of this is found in the arrangement and fixtures of the store, and in the methods that are followed for charging proper expenses of labor and material to a job under construction.

First Impressions —

The appearance of the display room is greatly enhanced by the use of mirrors on both sides of

On it must be entered the serial numbers and total costs of all time and material slips issued on this job number. The duplicate remains in the original entry book, and is used as a check on the ledger to insure against loss of the original while in the shop.

Time and Material Slips used by the Silver State Electric Company for keeping track of labor and material costs

The Material Slip is also serially numbered, to check against loss or misplacement, and is made out at the time the material is taken from the shop. It must show the job number of the original entry order.

The Time Slip is similar to the material slip, but has a different set of serial numbers. The serial number is used as a check to insure against loss or misplacement. The time slip is made out each day, if the workman is in the shop, and must state the number of the job on which the time should be charged. No time is allowed otherwise.

Bookkeeping Methods —

As stated above, the serial number of each time and material slip, together with total costs, is entered on the original entry order; a circle is made around the value on the time slip and the slips are filed serially. The original entry order then goes back to the bookkeeper, as soon as a job is completed, and is entered on the ledger. The total cost of the job, allowing for overhead and profit, is also entered on the original form. As the estimated or contract price also appears, a discrepancy between them is easily found and any deficit is shown in red.

A separate slip is made out in red for all material returned from a job.

Western Ideas

SYSTEMATIC DISPLAY OF MERCHANDISE is a selling factor which a number of dealers neglect, to their own disadvantage. It is frequently the case that certain goods after being purchased are stowed away in some corner, and half forgotten. Unless a customer happens to ask for them they are completely overlooked, but it is an established fact that the customer when in search of a particular article is most likely to go to a store where he has seen it displayed in the window. The dealer who has the article in stock and has neglected to display it loses a possible customer and drives trade to the door of his competitors.

An article in "The Electrical Trade" suggests that the entire stock be divided into twelve general sections and a selected display made of one section each month. This systematic plan of rotation will prevent the losses resulting from accumulated unadvertised stock and will increase the dealer's profits in proportion. It is suggested in addition that to each week in the year be assigned the task of making a special drive on a particular class of goods, advertising them in the newspapers and displaying them in the windows.

A STORE WITH A HOME ATMOSPHERE and artistic furnishings is something which appeals strongly to women shoppers, according to a certain well-known milliner. In her establishment the reception room is provided with a library table, comfort-



There is no reason why an electrical store should be so uncomfortable that women shoppers hurry through their business with it. An electrical store can be made just as attractive as a millinery establishment.

able chairs, a divan, large bronze bowls of flowers, and artistic hangings of soft greys and blues, with a touch of rose. There are no show cases and the hats are not on display. The whole effect is of something very exceptional and exclusive and the psychological effect upon customers, and upon the community's rating of the establishment, is very marked.

A modified form of this idea can very well be worked out to advantage by electrical dealers. A store interior arranged like a room and provided with comfortable and artistic furniture, carefully

arranged lamps and lighting fixtures, and the minimum display of other goods—such a plan has great possibilities for the electrical dealer, and would have a distinct appeal to women buyers. Most of these, at present, regard an electrical store as a jumble of incomprehensible fixtures and appliances, where they occasionally go to purchase some necessity. For many women shopping is a pleasure trip as well as a part of the day's business, but we have yet to meet the woman who enjoys buying a new electric lamp. It is not improbable that the atmosphere of the stores has much to do with this.

SYSTEM IN ORGANIZATION FINANCES is the message of this card distributed by the San Francisco Electrical Development League. All sec-

YOUR ATTENTION, PLEASE!

The following amendment to the By-laws of the San Francisco Electrical Development League is now effective:

"If the dues of any member are not paid within fifteen days from the date at which they become due, he shall be notified by the Secretary that he is in arrears, and if not paid within fifteen days from the date of such notice his name shall be posted in the room where weekly meetings are held; if still unpaid after thirty days' posting, the member shall be automatically suspended."

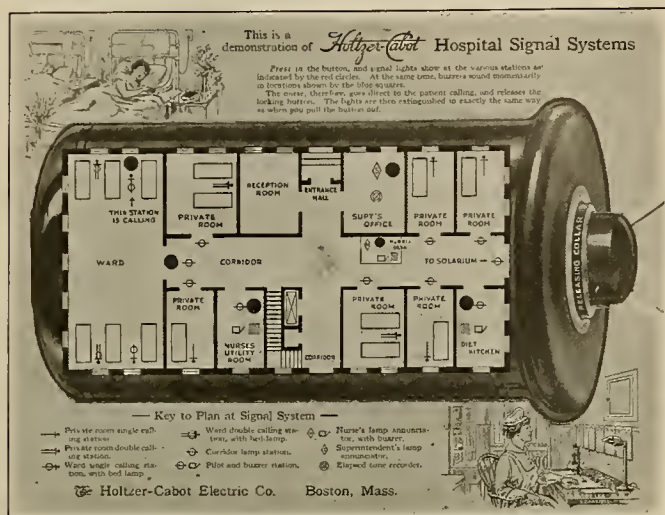
LET'S KEEP THE SLATE CLEAN

A labor-saving device for secretaries and treasurers who are generally the only people in an organization who know anything about the By-laws.

retaries and treasurers know the vast amount of time and energy expended in the collection of dues, and the tendency of the human animal to forget or ignore the requirements of by-laws which are so seldom brought to their notice. By transferring this one from the obscurity of the archives to the broad daylight of a forcefully-worded, freely distributed card, the organization does away with all excuse for laxity in payment of dues, and incidentally saves the secretary and treasurer a vast amount of trouble.

FOR ATTACHING WINDOW DISPLAYS to the inside of a window glass, one company sends out small pieces of adhesive plaster which are pasted over the holes in the display. One of the great drawbacks to the use of the brightly-colored and attractive displays issued by manufacturers has been the difficulty of placing them satisfactorily in the windows. If they are propped up from behind they tend to slide down to a rakish angle or fall forward with broken backs. Every draught tends to upset them. If, on the other hand, they are affixed to the window glass in the usual way, by means of strips of gummed paper, the effect is extremely untidy and unsatisfactory. The new method does away with the protruding pieces of paper and keeps the display firmly against the glass without the means of support being visible, and without the necessity of marring the face of the picture by the application of paste. The holes in the display, for the affixing of the adhesive, can be so arranged that they are merged on the design and not apparent.

AN EFFECTIVE ADVERTISING CARD is that recently sent out by the Holtzer-Cabot Electric Company to describe a hospital signal system. The original of the illustration is a double card with a movable slip inside, and perforations at the points representing the various stations. When the projecting piece of card representing the button is



A double card which illustrates graphically the effect of pushing a button. The inner slip is so colored that brilliant red spots appear under the perforation when the signal button is pressed.

pushed it moves the inside slip and brings red spots under the perforations to represent the simultaneous flashing on of the signal lights at these various points. In the center is the nurse on duty hurrying to respond to the call, and in one corner the patient who is pressing the button. The plan of the system itself is contained, as the illustration shows, within the outline of the bell-push, and the whole card is executed in bright and effective colors. The little movable device is a very successful medium by which to demonstrate the operation of the system, and achieves its object far better than an ordinary one-piece descriptive card could have done.

TO INCREASE TRADE during the dull summer months a certain stationer conceived what

proved to be a very successful idea. In the Sunday papers he made an announcement that, beginning Monday morning, he would circularize the town with fliers to advertise a special sale in every line of goods carried. On ten of these fliers, some one article, usually priced at \$2 or more, would be priced at 25 cents. All these ten articles were to be different, and the fortunate holders of the special fliers might purchase any one of the specially priced articles by presenting the flier and twenty-five cents. The result of this notion was that most of the leftovers were promptly disposed of, and a brisk sale of other goods was carried on. The moral of this is not merely that all the world loves a bargain but that all the world loves a lottery, and ten startling bargains will draw particular attention to a sale which would otherwise have only the ordinary attraction of "reduced prices." The idea of heralding the fliers by means of a newspaper is another good notion. An unannounced leaflet with no special credentials usually finds its way very promptly to the fire or the waste basket.

MOVING THINGS ABOUT in your store is one way of avoiding dead accumulations. It is not only the housewife who during spring cleaning discovers a forgotten article under the piano or behind the book case; the storekeeper who keeps his goods in the same place and on the same shelf all the year round is liable to bring to light the most unexpected things—things he never dreamed he had—when he begins rearranging his stock. There is another disadvantage in a hard and fast arrangement of goods; customers get into the habit of walking up to that part of the counter where the particular article they want is stocked, so that the rest of the store display is wasted on them. A change in arrangement would cause them to stop and notice other articles which they did not know they wanted until they saw them. Shuffle the stock at spring-cleaning time and do not let the arrangement become so familiar to the purchaser that the individual articles no longer arrest his attention but affect him as part of the general scenery.



Successful merchandising is largely dependent upon effective window displays. Here is an example of what can be done with something so apparently prosaic and non-decorative as wire. A more discouraging subject for the artistic imagination to work with could hardly be conceived, yet by an ingenious symmetrical arrangement and a striking background, an eminently successful display is achieved. Note how the lighting adds to the effect.



California Electrical Co-operative Campaign

(Under the hands of a manager, in new offices, and with very definite plans ahead for the coming year, the California Electrical Cooperative Campaign enters upon a period of vigorous usefulness. The following items of the conditions and results of the work throughout the territory are indicative of the great interest being shown in this work, and of its concrete accomplishments in good feeling and in sales returns.—The Editor.)

New Location —

The Advisory Committee of the California Electrical Cooperative Campaign has established its new headquarters at 619 Call Building, San Francisco, with the new secretary, Captain Howard Angus, busily at work.

The new offices are conveniently arranged with two offices—one for the secretary and the other for the two field representatives in this part of the state, Curt C. Davis and William R. Brainerd.

The Campaign's offices are separate from those of the California Association of Contractors and Dealers and the San Francisco section of the Contractors and Dealers, who have established new offices at 641-643-645 Call Building. It will be noted, however, that all three organizations have offices on the same floor of the same building. The work of the California Electrical Cooperative Campaign is so closely associated with the California Association of Contractors and Dealers that it was deemed best to have the offices conveniently situated for the efficiency of the two offices and the convenience of the business men in the electrical world who have business relations with both.

All the plans of the Advisory Committee of the California Electrical Cooperative Campaign will be pushed more vigorously than ever, and new ways and means devised to better help the electrical industry in its service to the public. The consumer will be given more attention and the story of the cooperative efforts of all branches of the industry in his behalf told to him.

Captain Angus, as secretary, will give his full time to the following work, as outlined in a letter to the contributors by Lee H. Newbert, Chairman Advisory Committee:

Attend the meetings of the Advisory Committee and make proper record of its proceedings.

Analyze the weekly reports of field men and submit to the Committee, at its meetings, a digest of same for its information and consideration. (Analytical study of the reports requires more time than the Committee has at its disposal, other matters considered.)

Supplement by follow-up letters the work of the field men.

Prepare and send to all contributors a monthly report of progress of the Campaign.

Assist the Committee in preparing advertisements for central stations and attend to their distribution.

Cooperate with the Extension Division of the University of California in promoting a more extensive use of its courses among members of the electrical industry.

Address meetings of electrical organizations, architects, building contractors, improvement clubs, etc., on various phases of the electrical business.

Prepare booklets on the many uses and advantages of electricity for distribution by contractors and dealers and central stations.

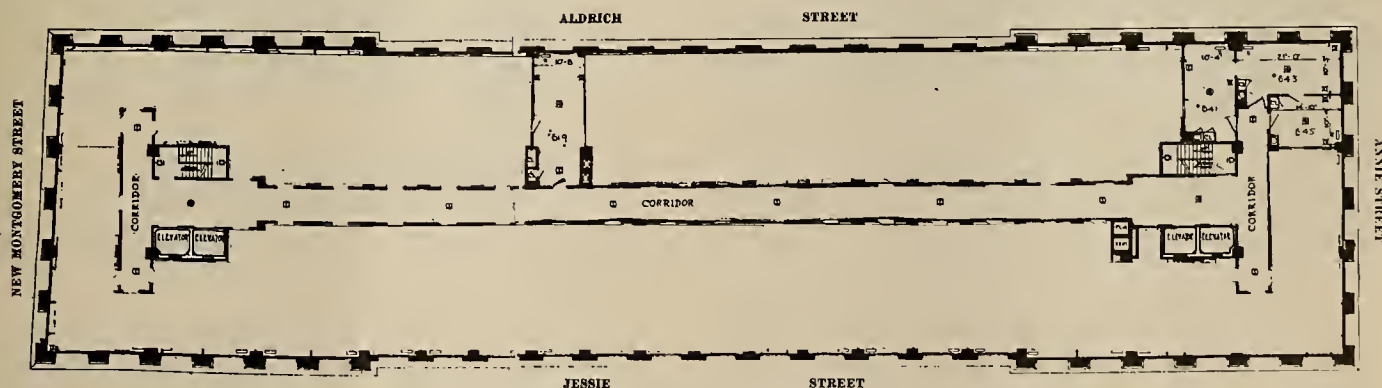
Prepare for the information of central station contributors reports of dealers' sales of appliances and motors, in order that they may have knowledge of the business secured through the efforts of dealers.

Solicitors in Demand —

The solicitor campaign has been so successful that the field representatives have a difficult time in supplying the demand.

The plan as outlined by the California Electrical Cooperative Campaign was to route the solicitors from one contractor-dealer to another as the requests came in. On paper the scheme was simple. In the actual working out of the plan, the field representatives soon found that the contractor-dealer refused as a general rule to give up the man sent to him. In other words, the practical lesson in soliciting, with its definite results, is being quickly learned.

But the field representatives find that solicitors are as hard to find as to keep. The present day result is that there are not enough to go around. The contractors and dealers are requested to be patient and their requests for solicitors will be filled as soon as the right men are secured.



Floor plan showing the new offices of the California Electrical Cooperative Campaign and the San Francisco Section of the Contractors and Dealers in the Call Building, San Francisco. The fact that the two organizations have their separate offices located near to each other on the same floor will be a distinct convenience not only to the organizations themselves but to those who have business with both.

Contractors and dealers should make a written application for solicitors to the office of the Advisory Committee and state whether they wish the man permanently or temporarily. This will greatly aid the work of the campaign. Each application will be given immediate attention.

The New Accounting System —

The field representatives of the California Electrical Cooperative Campaign are at present introducing to the contractors and dealers of the state the accounting system adopted by the National Contractors and Dealers' Association, National Association of Credit Men, and the National Electrical Credit Association.

As a general rule they have found the contractors and dealers of California quick to see the advantages of the system and ready to adopt it.

Mr. Brainerd has found the firms in the Sacramento and San Joaquin valleys deeply interested.

The Valley Electric Supply Company of Fresno have installed the system and are keeping their books open for the inspection of the other dealers of that city and near-by cities. The Shasta Electric Company at Redding have also adopted the system. The Dinuba Electric Works will install the system within the month. This store has just been purchased by J. M. Walsh and P. S. Briggs. James Northedge of Chico is also installing a system.

Many others have written checks for the accounting system and are now waiting for the delivery. Still more are considering the proposition favorably and will no doubt follow in the lead of the others.

Mr. Davis is at present busily explaining the system and taking orders in the bay counties. Robert King of the King's Electric Company in Oakland purchased the first set of Mr. Davis.

In Southern California Mr. A. L. Spring has just returned from his vacation and is explaining the advantages of the accounting system.

Campaign Notes —

The W. A. Cass Electric Store in Chico has moved on to the main business street of that city, and two weeks in the new location have brought a large increase in the business of the firm.

B. M. Kingsley opened a little shop last May in Corning, California, and began a wiring business. August finds him putting in a line of appliances and on his way to become an electrical merchant.

L. Edward Frank, manager of the Electric Motor and Machine Company, 4079 Stockton street, San Francisco, has made the discovery that fancy windows catch the eye of the people who live in apartments. He has had a run on three-pound irons and grills. These he has featured largely in his window displays. There is an art in finding out what people need and letting them know where they can fill their wants.

The Watts Electric Company recently opened its doors for the first time in Burlingame. Francis Watts, son of Frank Watts of the Watts Electric Company of San Francisco, is the manager. The store is located next to the principal motion picture theater in the town. Mr. Watts located where he

did with a purpose. With his well-planned and well-lighted window displays he stops the theater-goers on the way to and from the pictures. Many come back the next day to buy. The interior of the store is artistically arranged with a cozy corner for the women and potted plants to add to the decorative feature.

The San Jose Electric Company is the successor to the Gilbert Electric Company and is located at 38 West Santa Clara street, San Jose. The managers of the new company are Eugene Kuehnis and E. H. Snedaker. They intend to specialize in the merchandising of electrical appliances.

J. L. Thackeray, a veteran of the late war, has the progressive spirit. On his return to Red Bluff, California, he turned his old bicycle shop into a new electrical store. Much of his time is spent in wiring, but he has put in a well rounded stock of appliances and intends to feature the merchandising end of the business. Mr. Hughes, of the Northern California Power Company, is giving Mr. Thackeray splendid cooperation and the electrical store promises to be a permanent one in Red Bluff.

Cooperative Advertising —

An interesting result of the work of the California Electrical Cooperative Campaign is shown in the advertisement here reproduced. This was one of a series of advertisements entered into on a cooperative basis by the central stations and electrical dealers of San Bernardino.

It illustrates strikingly the new feeling of comradeship between members of the electrical industry

Take it Easy

During the Summer

WOMEN! You were made to grace and rule the home, not to be its serf and drudge. Why undergo the undermining, unnecessary labors of housekeeping, which are so oppressive during the heat of the summer? Or why ask your help to do the things that you'd dread to do yourself?

This shop presents a wealth of labor-saving and heat-defying devices that will do your summer work competently and keep the home cool, comfortable and livable.

Learn how economically you can install electrical washers, mangles, irons, vacuum cleaners, toasters, fans and cooking appliances. We sell them on easy terms and low cash prices. The maintenance cost is trifling—less than that of the present, out-of-date methods.

Buy From **ELECTRICAL** Goods Dealers

Southern California Edison Co. Southern Sierras Power Co.

Snyder & Bell 337-339 F St. Field Electric Co. 361 E Street

A sample of cooperative advertising, and a striking example of the work which the California Electrical Cooperative Campaign is doing in getting the different branches of the industry to pull together.

that the California Electrical Cooperative Campaign has successfully engendered. Two years ago, the idea of the dealer in electrical goods joining hands with the central station in an advertising effort of this kind would have occasioned considerable sur-

prise. Today it is accepted as a matter of course, so accustomed have we become to thinking in terms of cooperation rather than of competition.

This is only a single instance. Its counterpart can be found in nearly every part of California. Happily, this desirable situation is becoming more

general every day. The widening influence of the Campaign is becoming more and more apparent, and it is not too much to hope that the time is not far distant when the old feeling of mild antipathy, if not of positive antagonism, may be said to have been entirely dissipated.

Cooperation as a Bankable Asset

BY C. W. BANTA

(The bank stands ready to cooperate with its customers—in the recognition that it succeeds with their success. It is because the bank recognizes that this principle obtains in all departments of business that the existence of a cooperative spirit within any industry increases the credit standing of that field with the banks of its community. Not only is the way of the price cutter hard in the traveling, but moreover it is unsuccessful, as may be judged from this second article by the assistant cashier of the Wells Fargo Nevada National Bank.—The Editor.)

Let me illustrate the activity of the force of cooperation in everyday business matters: Charity should begin at home, therefore I shall start with banking.

Yesterday, banking was a business, credit was merchandise. If the borrower's needs were great, the interest rate was high—in fact, the price often made wreckage of the borrower. Any profit that could be taken by lawful force was legitimate. Today, banking is a profession, the same as medicine, or the law. More recently engineering, with its various branches, was added to the list of professions. Then came accounting; and the latest applicant has been that of insurance, with its various and tremendous problems, to insure the human race of its natural expectancies.

I suppose there was a time when a doctor held as stock in trade the secrets which he had learned regarding the functions of the human body, or the potency of drugs. Today, there are no secrets. The profession has been tremendously uplifted and the practice greatly improved because every discovery has been immediately disclosed to those who, by their education and inclination, were able to absorb the improved methods. Methods good for one physician are good for all, and that without detriment to any.

Today, banking is a profession. This implies that credits are no longer to be looked upon as financial merchandise; that profits are no longer to be regarded as gain to be taken from the individual customer. Profits are now to be derived solely as a bi-product, accruing without effort and without connivance, as a result of the faithful and efficient service that the bank affords to its clients.

I mean that the banker shall not say to himself, "I wonder how great a rate of interest I can charge this customer." Today, the rate of interest is standardized to yield the bank a fair profit. Every customer shall receive the same standard rate—all shall have equal opportunity to share the bank's facilities, so that there shall be no favored customers.

The bank is only as strong as its customers—it prospers, not as it is able to acquire more than a fair profit, but as its customers prosper. A banking institution's professional duty is to afford its clients the same kind of information regarding finance that a physician will supply his patient regarding medi-

cine, or an attorney regarding law, or an engineer regarding the accomplishment of a great enterprise.

A bank should study each and every client. It should analyze that client's physical, mental, and moral equipment. It should persuade its client to analyze himself, and to seek the cooperation of his fellows in the upbuilding of a profitable and efficient business organization.

Mr. Retailer, Mr. Contractor—you need cooperation more than anyone. Of course, you know it; but do you FULLY realize that you, alone, must be purchasing agent, sales manager, office manager, collector, and financial manager, all in one? Your larger competitors can afford to employ a specialist on each kind of duty.

If you are a good salesman, are you a good credit man? If not, get your bank, or your jobber, or your competitor into the habit of informing you regarding credit matters, so that you can deal safely and without worry. Reciprocate the courtesy—make lifelong friendships with your competitors.

Have you financial problems? Demand cooperation. Get an analysis of these problems from your banker, from your auditor, from your lawyer. Ask for the cooperation of the financial man connected with your jobber. He will help you. The business world today stands ready to cooperate, to assist every honest man to succeed. It will supply information and advice, and even certain facilities that will help you toward success.

A business organization, like a nation, is a being in the same sense that we are humans. It has a day of birth, it goes through its childhood, it creates a history, its antecedents become a matter of record, its reputation commences to be handed from mouth to mouth, its character becomes firmly formed.

It struggles to maturity and success, or ekes out a penurious living, or fails and dies.

It has a character, the same as we humans. That character is the composite of the ability, personality, ethics, policies, activity, characteristics, of its executives. It is well balanced only to the extent that it is dominated throughout by the safest, the highest, the truest ideals. The greatest measure of usefulness would be obtained if 100% cooperation could be obtained, by a group of men who would each consider his specialty a profession—like medicine, surgery, law or engineering. Such is business today!

Standardization of Outlet Box Numbering

(An important step forward has been taken by the Electrical Outlet Box Section of the Associated Manufacturers of Electrical Supplies in the adoption of a uniform numbering system for outlet boxes. This does away with errors and will prove a great convenience to retailer and jobber alike. The reasons for taking the step and its advantages are concisely given in the following statement, of interest to all handling or using this type of material.—The Editor.)

Probably no one group of electrical manufacturers is more anxious to receive suggestions from their clientele than the group manufacturing outlet boxes. The evidence of this progressiveness is shown in the recent determined action taken by them in adopting a standardized system of numbering for outlet boxes and covers.

On October 11, 1916, the Electric Supply Jobbers' Association unanimously voted in favor of some method of eliminating seven sets of catalog numbers in order to eliminate seven almost identical lines of outlet box cover numbers. The manufacturers immediately followed up this suggestion, but due to war activities, were compelled to side-track their efforts. Now, however, endeavor has turned to actual accomplishment. New catalogs of those manufacturers will shortly be on the market bearing the new standardized catalog numbers. Hereafter the trade will have but one number to consider; substitute numbers and cross indexing will be eliminated. A catalog number will mean a certain definite box; this number applying to this same box made by every manufacturer.

The method adopted is simple and clear—no key to remember; no puzzles to clear up. As an evidence of this, the numbers have been so worked out that the first two numerals of the cover for a certain size and shape of box, will be the same as the first two numbers of the box itself. The box number will consist entirely of numerals. The cover will be designated by the insertion of the letter "C" after the first two numerals. The flush plate will be designated by the insertion of the letter "R" after the first two numerals.

Standardization is a saving all along the line, and is becoming universal. When the new catalogs are distributed, all of the electrical trade, from the manufacturer to the wireman, will feel this saving.

A few of the reasons for the standardization of box numbers follow:

1. There are at present approximately 1,500 different numbers used in designation of boxes and covers of various manufacturers. There are, however, less than 200 distinct types.

2. Each manufacturer now has his own system of numbering, although the use and general type of almost any box or cover is identical with that of several manufacturers.

3. Both contractors and jobbers, in placing orders, will rarely ever take the trouble to look up and use the numbers of the manufacturer with whom the order will be placed. This necessitates the editing of orders by either the jobber or manufacturer and must necessarily result in numerous errors. On orders received from contractors, the jobber will almost invariably substitute the numbers of such boxes as he may have in stock, if shipment is to be made from stock, for those specified in the order; or, in case direct factory shipment is to be made, forward the order as received to the manufacturer with whom he may be placing his box orders at that particular time. This is invariably done unless the purchaser insists upon the particular make of boxes specified.

4. The types and styles of boxes and covers have become so standardized as to be almost on the same basis as

sizes of conduits; there is, therefore, no more reason why different numbers should be used to designate the same box as manufactured by different manufacturers than that different numbers should be used to designate the sizes of conduits.

5. With the various box manufacturers using separate numbering systems, it is now necessary for the device manufacturers to use as much space in listing the boxes or covers with which their receptacles, switches, attachment plugs, etc., may be used as to list the articles themselves. This is also applicable inversely; about as much space is used in the catalogs of the box manufacturers in listing the devices as in listing the boxes and covers themselves. Then, again, it is the almost universal custom of the various box manufacturers to list the corresponding numbers of competing manufacturers. To do this requires additional space.

6. For the box manufacturers to furnish the device manufacturers with the necessary data for a proper listing involves an enormous amount of detailed research work by the design, engineering and drafting departments of each; also voluminous correspondence. Errors are frequent. Both labor and errors could therefore be reduced to a minimum through a standardization of numbers.

7. For the various manufacturers to adopt a standard set of numbers would effect a considerable economy in catalog costs, and, in addition, reduce the volume of jobbers' catalogs. Take the sheets issued by the N. E. S. J. A.: separate sheets are now issued by this association, to show the lines of the several manufacturers. By the adoption of a standard set of numbers, these could be consolidated and one set of sheets used to show the lines of all manufacturers. This would reduce the volume of the association catalog by from 100 to 200 pages. Same would apply to the National Electrical Contractors' Association Data Sheets.

8. The reduction in the volume of sheets would be particularly appreciated by jobbers' salesmen, as it would considerably reduce the weight of the catalogs which they have to carry.

9. A jobber, in getting out a new catalog, would feel no hesitancy in listing a standard set of numbers, cuts, etc., for he could so list and place his orders with any manufacturer; at the present time jobbers are frequently carrying the listing of one manufacturer's line and furnishing boxes of some other manufacturer.

10. Separate numbering systems, as now used, give recognition to substitutes, which at best is a bad practice and not to be encouraged. If encouraged in one line, as at present in the outlet box line, leeway is allowed for substitution in all lines.

11. The adoption of a standard numbering system would prove educational to all in the electrical business, for contractors, salesmen, wiremen, clerks, etc., would soon become familiar with any system adopted and know that an XYZ box was a box of a particular type and for a certain use. With so many different numbers, as is now the case, this is impossible.

12. While some advantage might now accrue to the various manufacturers through familiarity of portions of the trade with their own "pet" numbers, the adoption of a standard set of numbers would prove reciprocal, and each manufacturer would benefit in about the same proportion.

13. The adoption of a standard set of numbers would in no way interfere with the various manufacturers playing up the strong points of their own lines, such as finish, detailed construction, materials used in manufacture, etc. As a matter of fact, these features could be emphasized more than is now possible. In ordering, the contractor, if he wanted a particular make of box, could specify by giving the name or brand and then list the standard numbers desired. As indicated in a previous paragraph, this would reduce substitution to a minimum, eliminate frequent errors, etc. If no particular brand was specified, the jobber would then understand that no preference existed, and could ship from his stock or place order for direct shipment with his preference of manufacturers.

Cracking of Pin Type Corner Porcelain Insulators

BY S. L. FOSTER

(The cracking of pin type corner porcelain insulators which is a troublesome problem on most power lines, seems to have been satisfactorily solved by the United Railroads of San Francisco by the adoption of a simple method of painting with shellac. The details of this experiment and the possible breadth of its application are here suggested by the chief electrician of that company, who is intimately familiar with the problem as it there presented itself.—The Editor.)

The United Railroads of San Francisco has been in the a.c. high tension insulator game for the past seventeen years in a modest but appreciable way, and has had its share of experiences with the local problems connected with the art. While the highest voltage worked with has only been 13,000 and the feature of progressive deterioration of insulation resistance has not bothered, under the salt fog conditions met with, the problems of burned-off wood pins, crossarms and pole tops, and of crooked insulators, have been very much in evidence among the 9000 insulators involved.

The literature on these subjects contained in the trade journals, Institute proceedings, etc., has been followed, and the writer thinks he has a little information that may be of interest to the craft.

Problems Which Have Been Solved

The problem of how to prevent burning of wood pins, crossarms and pole tops seems to have been solved, it is generally understood, and is no longer discussed.

It seems to be only a case of paying the price. Burning of wood pins stopped when they were replaced by metal pins. Burning of arms and pole tops stopped when the three pins were connected electrically, cracked or broken insulators immediately replaced by sound ones and the insulators kept clean. This cleaning may mean once a year or oftener, depending on the local conditions, and must be learned from local experience.

Of the three items, metal pins, electrical connection between pins, and clean insulators, neither can be dispensed with in foggy districts without running the risk of interruption to service. The inexpensive copper wire connections between the pins will reduce the amount of expensive cleaning required but will not eliminate it entirely. Three years' experience with connected pins on several hundred poles, in a location of severest fog conditions, seems to prove the above claims by the testimony of phenomenally immediate reduction in annual number of pole top fires after connecting the pins.

Cracked Insulators

The problem of cracked pin type insulators is yet heard from occasionally, and how the United Railroads has been treating this problem on 11-kv. circuits maintained for the Sierra and San Francisco Power Company seems not to be generally known.

In the early days of iron pins cemented into corner insulators, when the linemen gave the insulators on the 13-kv., a.c. lines their annual or semi-annual cleaning necessitated by our local fog conditions, they discovered about one per cent mechan-

ically defective. These two part corner insulators, of a factory test voltage of safety of about 7, had been cemented on hot dipped galvanized solid iron pins with litharge and glycerine. Some showed the inner shell cracked vertically from the lower skirt upward, and some showed the tops of the outer shell cracked off entirely under the tie wire. These insulators were Locke 103 and 408A. No straight line insulators on lead top pins failed. (Iron pins with cast lead sleeves have been in use locally since 1892.)

Theories of Failure

The natural diagnosis was that the breakage of the inner shell was due to the difference in coefficient of expansion between porcelain and iron, iron expanding over three times as much per degree rise in temperature as porcelain. The breakage of the top of the outer shell seemed likely to be due rather to a similar expansion strain from the cement used by the manufacturer of the insulator between the two parts, as the iron pin did not reach high enough to effect this rupture—as was proved by the top of the inner shell always being found intact, and because of the well known fact that the linear coefficient of expansion of cement is nearly three times that of porcelain. The question of the constricting effect of the tie wire being responsible for choking off the top of the insulator was not considered on account of the usual looseness of the tie on corner insulators.

The manufacturer was informed of the failures and our theories. Neat Portland cement was substituted for litharge and glycerine for cementing the iron pins in place, but the cracking of the lower shell continued although the depth of the cement around the pin in the upturned lower shell was reduced to the exact length of the thread in the porcelain.

The percentage of cracked insulators has shown a progressive annual increase. In 1919 5.25 per cent of corners cleaned "cold" were found cracked, and of those cleaned "hot," where detection of cracks was less effective, 3 per cent.

A European Method

About three years ago a report reached the writer that a visiting Danish engineer, who had come to this country in search of a preventative for cracked insulators, had reported good results in Europe on pin type insulators from a coat of orange shellac applied around the pin where it is cemented into the porcelain. The idea was that the dried coat of shellac had sufficient elasticity to yield to the difference in expansion between that of the iron pin and the enclosing cement and porcelain, and thus relieve the strain on the porcelain and prevent shattering of the insulator.

The data according to one authority are as follows:

COEFFICIENTS OF EXPANSION FROM 32° to 212° F. BRITISH BOARD OF TRADE (CLARK)

Neat Portland Cement.....	.001070	2.97
Wrought Iron .....	.001166	3.24
Porcelain .....	.000360	1.00

The dimensions of the square cross-section of the part of the iron corner pin cemented into the insulator is .875 in. by .875 in. The maximum seasonal range of temperature in San Francisco was assumed as about 60° F.

LINEAR EXPANSIONS OF .875 INCHES FOR RANGE OF 60° F. FROM 32° TO 92° F.

Cement .....	.00031185 in.	
Wrought Iron .....	.00034020 "	
Porcelain .....	.00010500 "	
Excess expansion of Iron over Cement.....		.00002835 in.
" " " Iron " Porcelain .....		.00023520 "
" " " Cement " Porcelain .....		.00020685 "

This means a difference of a fifth of a thousandth of an inch to be provided for in the elasticity of the shellac to take care of the excess expansion of the cement over that of the porcelain and a thirty-fifth of one thousandth of an inch to be provided for in the shellac cushion to take care of the excess expansion of the iron over that of the cement and neutralize the cumulative action of the iron and the cement expansion concentrating on the porcelain. As roughly bearing out the above figures on expansion, the condemned insulators had several large cracks in the porcelain lower shell outside of the cement and only a hair line crack in the cement outside of the iron pin.

Success in Application

When the United Railroads linemen that year began to turn in cracked corner insulators they were supplied with insulators cemented on iron pins that had been given two coats of shellac on both sides and top. These pins were given a distinctive mark but none of these shellaced pins have yet developed cracked insulators. The total thickness of these two coats of shellac was .00325 in., thus increasing the thickness of the square iron pin by .0065 in.

The next lot of cracked insulators were given an added film of cushioning material to absorb the expansion strain from the cement by having the whole inner surface of the pin hole in the insulator given a liberal coat of shellac beside the two coats on the iron pin, thus trying to take care of both the excess expansion of iron pin and assembling cement over that of porcelain, as well as sealing the surface of the porcelain so as to prevent absorption of the cement into the pores of the insulator and the later strains of crystallization from the cement crystals left in the porous unglazed porcelain after the cement had dried.

A Field for Experiment

It was assumed that the Danes had selected orange shellac after elaborate tests of other elastic films and no other solutions of asphaltums, gums or resins have been experimented with. There are a multitude of different kinds of elastic films that can be deposited on an iron pin from solutions of alcohol or benzine, and there may be a better designed

varnish for this insulator purpose than shellac. Again, orange shellac may not prove as satisfactory in its cushioning results where the range of temperature is higher than the 60° F. that is assumed to prevail in San Francisco. Also, it may be contended that the insulators mounted on the later pins were of later design and would not have cracked even if no shellac had been applied to the iron pin. As bearing this point out in part is the fact that not only have none of the later insulators provided with shellaced pins developed cracks in the lower shell, but none have had the tops of the upper shell cracked off where the effect seemed clearly due to assembling cement used in manufacture and to be inaccessible to any remedial action from pin cushioning far below it. This is not the last word on the subject, as one of the manufacturers of suspension type insulators is said to have tried to obviate this cracking of porcelain shell from expansion of the cement luting and iron bolt by giving the top of the shell a capping of wax and mounting a disk of compressible material on the top of the bolt before they are assembled and cemented in place. (Austin: "High Tension Insulators," 1917 Proceedings A. I. E. E., page 554, third paragraph.)

No Failures

The fact that may be of interest is that there has not yet been a case of a cracked insulator mounted on a shellaced corner iron pin reported, although some of these insulators have been in service for three years, while similar ones only four years in service but without shellaced pins have failed both in upper and lower shells from simple radial differential expansion strains, apparently, as evidenced by the characteristic cracks just mentioned. As the depth of the cement in which the pin was set has not been reduced, the credit for the improvement is hoped to be due entirely to the use of the shellac. So far it is a hope only, as there are corner insulators still in service that were set up in 1902 and that have not yet cracked although their pins had no coating of shellac put on them—some with litharge and glycerine and some with Portland cement as assembly luting between iron pin and lower shell, and all with the lower shell more deeply filled with cement around the iron pin than the shellaced ones.

Extending the Principle

If shellacing the iron pin will cushion out the surplus stress resulting from the expansion and prevent the cracking of the lower porcelain shell, it would seem logically as if shellacing before assembly the inner surface of the outer shell and the outer surface of the inner shell, would tend to cushion out the surplus stress resulting from the cement expansion and prevent bursting of the outer shell.

The United Railroads has had such assembled corner units in service on test for a short time without failure, the assembly having been made at 60° F., about the half-way temperature between the local seasonal limits assumed, namely, 32° and 92° F., and in the insulators installed at identical locations from which similar but unshellaced units had been removed shattered by expansion strains.

The assembly cement employed was the ordinary Portland cement used in building operations and of unknown capacity for absorption of moisture.

The two annular surfaces of cement between shells and between lower shell and iron pin were covered with lime-resisting paint to secure permanent waterproofing and to minimize the absorption of water and the continuously progressive expansion of cement that is said to result from repeated cycles of alternate moisture and dryness.

If this elastic film of shellac varnish on the adjacent grip surfaces of the two shells as just suggested does not interfere with the adhesion of the cement and the rigidity of the assembled unit, it may render an additional and important service in sealing these unglazed surfaces from absorption of cement liquor whose subsequent evaporation is said to leave deposits of crystals in the pores of the porcelain that exert great mechanical stresses. Probably a cheap cement can be invented that will combine the permanence of the Portland cement and the elasticity of the shellac and can be used for assembling multipart pin type insulators so as to practically eliminate the rupturing stresses due to the different coefficients of expansion of iron, assembling cement and porcelain as well as the stresses from cement crystallization deposits in the porcelain.

If the correct theory of the cause of the deterioration of suspension type insulators is that it is due chiefly to expansion and not to porosity, as is claimed by Brundige ("Expansion Effects as a Cause of Deterioration in Suspension Type Insulators," 1917 Proceedings of A. I. E. E., page 535), this elastic varnish idea may help solve the problem of deterioration of the suspension type insulator.

Determining Temperature Range

How many coats of elastic varnish are going to be required to compensate for the differential expansion and how much this differential expansion amounts to are questions yet to be learned, as the temperature ranges are hard to determine.

That this is a fact is clear from the reports of linemen sent in fog storms to reported pole top fires on crossarms carrying pin type insulators. They have found the iron pins at night showing from the ground, red hot in the enlarged burning holes in the wood arm. When one reflects that the temperature of iron showing bright red in the dark is 752° F. it is seen that a seasonal range of local atmospheric temperatures is not a safe or even a reasonable basis for cushioning provisions against differential expansion in multipart porcelain high tension pin type insulators with cemented pins.

An additional good feature of this elastic film treatment is worth mentioning. The shellac seems to contract progressively. After several days had been allowed for drying and the varnish appeared hard, the assembly of the corner pin and insulator was completed. After a week for the cement to dry it was found that the pin was slightly loose in the cement setting, indicating a slight air space of about a hundredth of an inch to assist the elastic films in compensating for the differential expansion strains.

THE MOST EFFICIENT MANNER OF HANDLING SALESMEN AND SOLICITORS

BY WM. H. GRIBBLE

(Direct personal "backing-up" has long been recognized as a most effective stimulus to successful work. The proprietor of the Western Gas and Electric Appliance Company of Chico, California, is of opinion that the principle might be more widely applied in the relationships of the dealer with his salesmen and solicitors. This was one of the important papers presented at the recent Santa Cruz Contractor-Dealer convention.—The Editor.)

To get the most efficiency from salesmen and solicitors a dealer must first interest himself in them, and make up his mind that he must cooperate to the fullest extent.

Personal Assistance —

First of all, he must endeavor to keep the solicitor from becoming discouraged. This he can do by meeting him as often as possible, discussing his work, looking over his prospects, and endeavoring to lend some assistance in closing sales. He should give the solicitor suggestions, if possible, concerning some of the people he is well acquainted with, and if he finds that he is becoming discouraged or that he has not been very successful in closing many sales, he should endeavor to find some live prospects and give them to the solicitor.

Support by Advertising —

A dealer should back up the work of a salesman or solicitor with the proper kind of advertising, also with good window displays and store arrangements, featuring an article, or at least some articles that the solicitor is featuring. Or if no feature sale is being carried on, the dealer should advertise some prominent article which would give the salesman the broadest opportunity possible.

A great many dealers (as I gather from talking with salesmen, particularly specialty men who visit a large number of dealers and endeavor to assist them in the sale of washing machines) seem to feel that when they have employed a salesman or solicitor it is not necessary for them to do anything except allow him to work on his own initiative, without any assistance in the way of personal interest, advertising, or anything else. All they expect is a substantial number of sales, and if the solicitor does not make them, they consider him a failure and an expensive experiment.

Circular Letters and Interviews —

A dealer should also back up a salesman or solicitor by circular letter work, and personal work, sent out by the dealer as the prospects come in; and if he finds that there is any way in which he may be able to lend assistance by a personal interview, he should also do this in order to gain the confidence of the salesman and assure him that everything is being done to help him make a success.

Finally, the dealer should assist the solicitor by following up the prospects by phone calls, which have the same effect as letter work in both encouraging the solicitor and at the same time getting the dealer or the firm in direct contact with the prospect—a proceeding which very often creates more confidence on the part of the prospect.

The Business Library

BY LOUISE B. KRAUSE

(People, places, organizations; financial and population statistics; who's who in your industry—questions about these come up hourly in most modern businesses, and the business library which has the right kind of reference books has the desired information in the most accessible form. The librarian of H. M. Byllesby & Company of Chicago here lists some of the best directories, atlases, and year books for the business library. Written permission is necessary to reprint from this series of articles.—The Editor.)

REFERENCE BOOKS FOR THE BUSINESS LIBRARY

(Continued from August 15th issue)

The United States Bureau of Foreign and Domestic Commerce publishes each year the **Statistical Abstract of the United States** at 50 cents per volume, paper binding, or it may be had in cloth. This abstract gives tabulated statistics covering a number of years on the natural resources and various economic activities of the United States. This Bureau also publishes annually a valuable volume of statistics entitled **Foreign Commerce and Navigation of the United States**, which gives statistics of imports and exports of different classes of merchandise with rates of duty, quantities, and value.

For commercial, political and statistical information about foreign countries the "**Statesman's Year Book**," a British publication issued annually by Macmillan, at \$3.50 per volume, is a valuable addition to any business library. It also gives a list of the best books on each country and its most important government publications, and includes a list of books relating to the war and a diary of its principal events. Maps of the different countries are also included.

The American Newspaper Annual, a directory published by Ayer and Son, Philadelphia, price \$5.00, gives a list of all newspapers and periodicals published in the United States and territories, Canada, Cuba, West Indies, arranged by states and cities, with maps of the states and information about the industries and institutions of each city. It gives the population of cities and towns of the United States and Canada whose population is over 3,000. It lists all publications in foreign languages printed in different states of the United States, and also gives a list of trade papers for certain industries.

Rand McNally's Commercial Atlas of America, published annually, price \$20.00, is the best atlas of its kind on the market for a business office. The maps are indexed, and information on population, express offices, United States money order stations and the railroads of each town and city are given. This atlas has maps of the largest cities. Steamship and interurban lines are also shown.

Another valuable guide is the **Official Hotel Red Book and Directory** of the United States, Canada, Mexico, Cuba, Hawaii, West Indies and South American cities, published annually by the Official Hotel Red Book and Directory Company, New York City, price \$3.00. This guide lists hotels under cities with brief notes on accommodations and rates.

The **Official Guide of the Railways and Steam Navigation Lines** of the United States, Porto Rico, Canada, Mexico, Cuba, also time tables of railroads

in Central America, is published monthly by the National Railway Publication Company, New York City, \$10.00 per year. It gives the current time tables in effect and the maps of the various railroads with indexes of their stations, and a general alphabetical index of all railway stations in the United States, Canada, Mexico, showing on what railroads a given place is located, with a similar index for points reached by water routes.

United States Official Post Office Guide, issued annually with eleven monthly supplements at \$1.00 per year, gives information about mail rates and post office rulings, and also gives a complete list of the post offices in the United States.

The business library will find it helpful to obtain a single volume published by the Census Bureau entitled **Abstract of the Thirteenth Census of the United States, 1910**, which may be procured from the Superintendent of Documents, Washington, D. C., at the cost of \$1.00. This abstract gives in condensed form with explanatory text, statistics to be found in the eleven volumes report of the 1910 census covering population, agriculture, manufactures and mining of the United States as a whole, individual states and principal cities. This abstract volume is issued in special editions for each state of the United States, which give special statistics pertaining to that state.

In regard to population figures, it is probably not generally known that the Census Bureau has issued bulletins giving estimates of the population of cities for each year subsequent to 1910, so that population figures for 1910 need not be considered as the latest official figures available.

The reference collection of a business library must be strong in books which will serve as directories of persons and industries, in order to answer questions on "who is who" and "where and what" are certain business organizations. The important point for consideration in selecting directories for a business library is that they must be not only accurate but as nearly up-to-date as possible, to be of real value.

Who's Who in America, a biographical dictionary of notable living men and women of the United States, giving brief biographical data and addresses of over twenty thousand Americans prominent in business and public affairs, professional life, or as authors, published biennially by A. N. Marquis and Company, Chicago, \$5.00 per volume.

There are also similar brief biographical dictionaries published for certain states and cities which will be well known to the public libraries in those particular localities, and which will not be listed here as they are not of general interest to all localities;

for example, **The Book of Chicagoans, Who's Who in New England, Directory of Directors in the City of New York.**

Every business library will need the latest edition of the **Congressional Directory**, as all business firms have at some time correspondence with, or need of information on, congressmen, committees, departments and bureaus of the Government, also diplomatic and consular service. This volume may be purchased from the Superintendent of Documents, Washington, D. C., for 60 cents, in cloth binding.

The membership lists of national organizations representing different professions and industries are also very valuable, such as the membership of the American Society of Mechanical Engineers, American Society of Civil Engineers, and other associations devoted to business interests as well as to professional work. The city directory and telephone list of any community must not be forgotten as helpful reference aids, also state gazetteers, and the collection of directories of various cities to be found at the public library will be found most useful.

G. P. Putnam Sons, New York City, publish a handbook called **Directory of Mailing Lists, Obtainable in Book or Pamphlet Form**, price \$2.50, which tells where printed mailing lists of certain industries or classes of people may be obtained free or at a reasonable price.

Public Affairs Information Service, a weekly or bi-monthly cumulated service, according to the needs of subscribers, and cumulating in an annual volume, published by the H. W. Wilson Company, New York City, is a subject index to articles in current periodicals, pamphlets and books covering current economic problems. Price upon application. It is a valuable index to consult at the public library, as it is too expensive for the small business library.

Thomas' Register of American Manufacturers—"first hands in all lines"—is an indispensable directory. It is published annually by the Thomas Publishing Company, New York City, price \$15.00. The entries are in three main sections. The first section classifies the manufacturers according to their products, in an alphabetical subject list; the second section lists the manufacturers alphabetically by their names, gives addresses, branch offices and officials for many of them; the third section lists all the popular trade names alphabetically, and there is an alphabetical index of subjects at the beginning of the volume, with plentiful cross references to all the subjects listed in section one.

The Reuben H. Donnelley Corporation, Chicago, publish semi-annually a "Red Book" of classified advertisers, which appear in the classified telephone directories issued by them for various cities, and which is furnished free to any firm who will use it sufficiently to justify placing a copy with them. It purposes to be absolutely up to date, and its second section is arranged by states, thus enabling the user to locate firms in his immediate neighborhood.

Exporters and importers will find most useful, Kelly's **Directory of Merchants, Manufacturers and Shippers of the World, 1919**, Kelly Publishing Company, 70 Fifth Avenue, New York City, price \$15.00.

The organization, personnel of management, earnings and financial history of industrial corporations in the United States is given in **Moody's Manual of Industrials**, which is one of a trilogy costing \$40.00 per annum, published annually by Poor's Publishing Company, New York City. The other two volumes are entitled **Moody's Manual of Public Utilities** and **Poor's Manual of Railroads**.

Moody's Analyses of Public Utilities and Industrials, and **Moody's Analyses of Railroad Investments** cover much the same ground as the manuals just noted with the addition of ratings. They are published by John Moody, 35 Nassau street, New York City.

The Manual of Statistics Stock Exchange Handbook, similar in contents to the Poor & Moody volumes but not as full, is published annually by The Manual Statistics Company, New York City, at \$5.00 per volume.

Investment Bankers and Brokers of America, issued annually by H. W. Sites, 80 Lafayette street, New York City, \$10.00 per volume, is a useful directory to be used to supplement **Rand McNally Bankers' Directory**, issued semi-annually in January and July, Chicago, price \$6.00 per volume, or the **Bankers' Encyclopedia**, issued semi-annually in March and September, New York, price \$8.00 per volume.

For the business firm who wishes to keep up to the minute on the latest information of what is going on in the world as affecting trade and finance, the Standard Statistics Company, 47 West street, New York City, issues **Standard Daily Trade Service** at a cost of \$120.00 per year, which delivers each morning by first class mail a conveniently indexed and itemized digest of the important news regarding crops, commodities, countries, legislation, taxation, Federal trade regulation, transportation, etc., and in addition gives the subscriber the benefit of a Personal Service department for special information of value to him individually which does not appear on the daily report sheet.

In addition to the Daily Trade Service, the Standard Statistics Company also issues a similar daily service entitled **Corporation News Service**, which summarizes all the corporation news of the country. It also issues a **Corporation Card and Bond Card Service** which furnish daily revised card descriptions of corporations and bond issues.

The Federal Trade Information Service, 31 Nassau street, New York City, is similar in frequency and form of issue to the standard Daily Trade Service but is not as comprehensive in scope, as it covers only the activities of the Federal Government.

There is scarcely any industry which has not put out a reference handbook or directory covering its special field, and it is impossible in a brief article to list all of the reference books which pertain to a large number of industries. The best printed list from which to determine what directories and handbooks have been issued for certain industries is "**1600 Business Books**," which has been previously noted. Consult also the trade journals, and above all, do not forget to use the reference facilities to be found at the public library.

FUEL OIL AND STEAM ENGINEERING

(The economics in fuel oil secured through automatic control in steam plants have made possible such records as those achieved in the Arizona plants reported in the August 1st issue of the Journal of Electricity. Preliminary to such accomplishments must come such studies as the one here presented as to the relationship of oil and steam pressures which results in the greatest boiler efficiency. The author of this important contribution to fuel oil practice is chief engineer of Chas. C. Moore & Company, engineers of San Francisco.—The Editor.)

INFLUENCE OF LOAD ON PRESSURES OF OIL AND ATOMIZING STEAM IN OIL BURNERS

BY C. R. WEYMOUTH

Very little information has been published concerning the oil pressure to operate oil burners at different rate of firing, or the steam pressure necessary to give proper atomization with a minimum quantity of steam. In the average plant, hand controlled, the oil pressure is maintained at a constant pressure by means of a pump governor, and the supply of oil to the burners is controlled at each burner by the burner oil-throttle valve, and similarly the supply of steam to burners by the burner steam-

responding to the difference between the steam pressure necessary to atomize the oil at a given load, and the maximum or boiler steam pressure.

Tests with Oil Burners

With the present-day high price of fuel, and the special effort that is now being given towards the conservation of fuel and other resources, it is thought that a brief review of certain test data will be of interest to fuel oil users. The test data given is taken from a report to Chas. C. Moore & Company, Engineers, dated July 1, 1907, by G. Chester Noble, then assistant professor of electrical engineering, University of California. The data from these

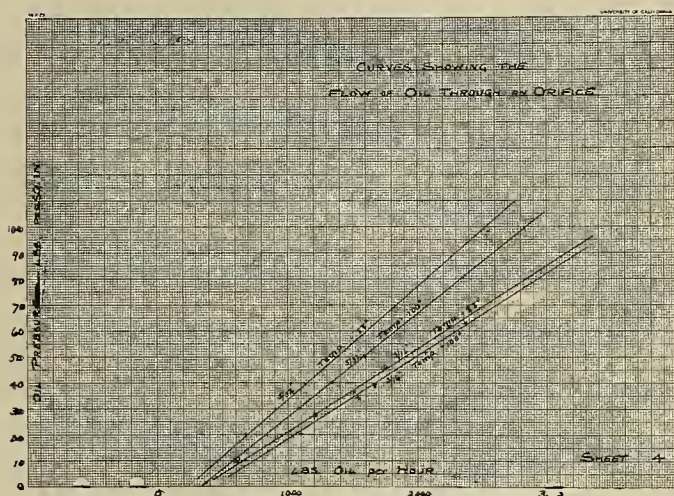
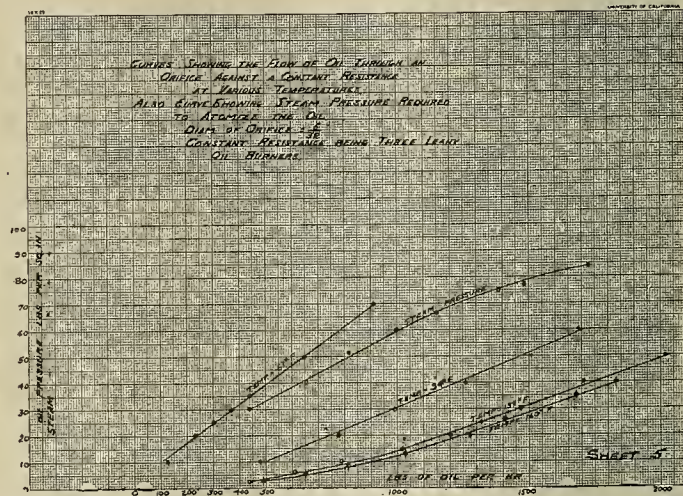


Chart showing the flow of oil through orifices of a stated diameter at different temperatures. It is to be noted that for a given temperature and orifice, the rate of flow is almost directly proportionate to the pressure.

throttle valves. In times past engineers have debated the advisability of carrying higher or lower oil pressures at the pumps, as influencing the economy of firing the boiler, without stopping to think that any surplus in pressure over and above that necessary to force the oil through the burner orifice, must be overcome by the friction of the oil-throttle valve, and that unless the load on the burner or the rate of oil firing changes, any increase in pressure at the pump above the necessary minimum, has no effect whatsoever on the performance of the burners, or the pressure between the burner-throttle valve and the tip of the burner.

Also, it is not generally known that a comparatively low steam pressure furnishes all of the steam necessary for atomizing oil at the lighter loads, and that the maximum steam pressure at the burner, generally speaking, can be considerably less than the boiler pressure. From this fact it is apparent that unless the steam-burner throttle valves are closely regulated a large waste in steam is permissible, cor-



Curves showing the flow of oil through an orifice and length of piping at various temperatures. To this is added a curve showing the steam pressure required to atomize the oil. Diameter of Orifice = $\frac{5}{32}$ in. A constant resistance was maintained against three oil burners connected in parallel.

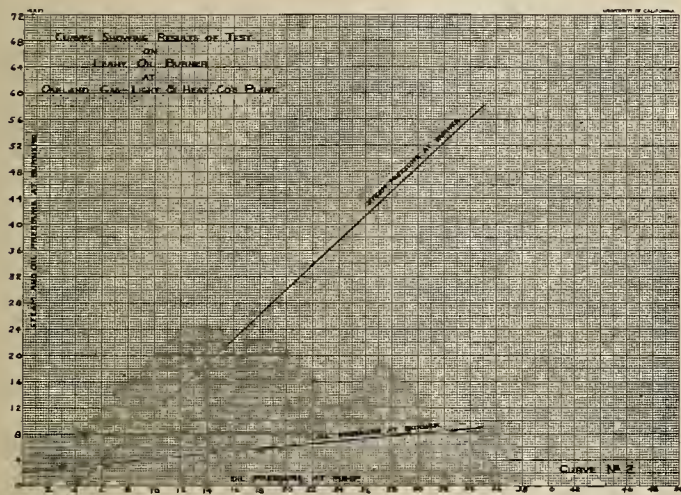
tests was the basis of the initial design of the Moore Automatic Fuel Oil Regulating System, by Chas. C. Moore & Company, Engineers. It happens that all of the burners tested were of the external atomizing type, the particular burners selected being those which were available for the work, without any preference as to make of burner. The oil burned at that date was practically crude oil, which was somewhat heavier in gravity and considerably more viscous than the topped oil now generally used in this vicinity for fuel purposes.

Sheet No. 4 herewith gives data as to the flow of oil through orifices of stated diameter at different temperatures. The specific gravity and viscosity of the oil were not observed at the time. It will be seen that the plotted points fall practically on a straight line, indicating a flow of oil for a given temperature and a given orifice nearly proportionate to the pressure; and it is interesting to note that with the oil then used, a pressure gauge in the burner line so placed as to record the pressure on the oil burner orifice, was a rough index as to the rate of flow of oil, or the relative load on the boiler.

Sheet No. 5 gives additional data, being the flow of oil through an orifice and length of piping, including also the resistance of three oil burners connected in parallel. The curve also shows the steam pressure necessary for atomizing the oil used by the burners. It will be observed that the curves of oil pressure and of steam pressure are nearly straight lines. The tests for both of the above curves were made at the University of California.

Curve No. 3 gives tests showing oil pressure and steam pressure at burner at the old Third Street Plant of the Pacific Light & Power Company, Los Angeles.

Curve No. 2 gives similar data at the plant of the Oakland Gas Light & Heat Company, Oakland, now Station "C," Pacific Gas & Electric Company.



Test data showing oil and steam pressure at burner at the Oakland Gas, Light & Heat Company's plant, now Station "C" of the Pacific Gas & Electric Company.

Sheet No. 10 gives results of various tests, in which the steam-pressure and the oil-pressure on the burner are the two variables. It is apparent that the curves represent practically straight lines.

Sheet No. 6 shows the influence of temperature on the flow of oil through an orifice, the pressure difference remaining constant.

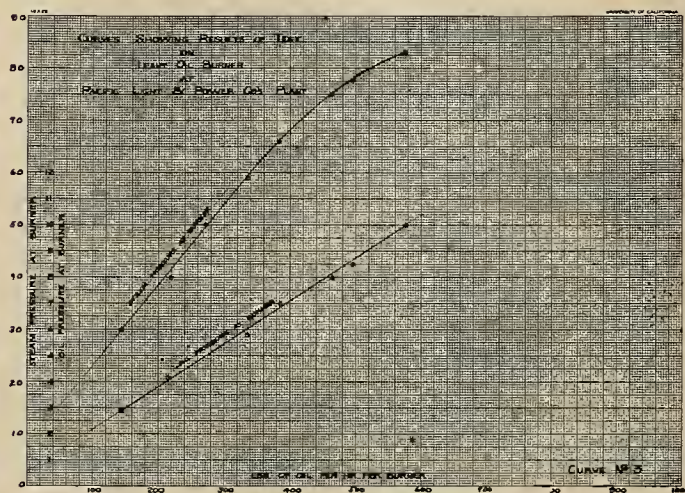
Practical Application of Test Data

To illustrate the application of the above data in the design of the Moore Automatic Fuel Oil Regulating System, now in use in a number of prominent plants in the West, it should be stated, for those not familiar with the details of this system, that it operates on the principle of central control instead of individual control of the burners and dampers. The oil burners and valves are left wide open, or nearly so, and a variable oil pressure is maintained in the oil-burner header to give an equal pressure at all burners, the pressure varying with the load, controlled automatically by throttling the supply of oil to the header, to maintain a nearly constant steam-boiler pressure. As in most plants, burners must be designed to handle very heavy oil and also to permit heavy overloads on boilers, the average pressure at the burner at normal loads is very low and but a few pounds. To build up the pressure in the oil-to-burner header, and to prevent the friction in the header causing an unequal supply of oil to all burners, a resistance, due to a diamond-ported regulating cock, is inserted in each burner-branch pipe between the main throttle valve and the tip of the burner and set to give such resistance that the pressure in the header at normal load on the boilers will be 20 or 30 lb. or thereabouts, depending upon operating characteristics, etc. Then a slight pressure

drop in the header would have little effect on the unequal supply of oil to the various burners.

The oil pressure gauges connected to this header are located in the front of each battery of boilers, so that the firemen can tell approximately, from the reading of the oil-pressure gauge, the relative rate of firing of boilers.

A low pressure steam header is similarly connected to all burners, but generally without the diamond ported valve as a resistance, the pressure being



Curves showing relationships of steam and oil pressure at burner during a test on a Leahy Oil Burner at the old Third St. Plant of the Pacific Light & Power Company, Los Angeles.

high enough without this resistance. The supply of steam from the main boilers to the low pressure burner-header, and its pressure, are controlled by means of a special throttle valve, generally known as a chronometer valve, and this chronometer valve is in turn controlled by a steam-to-burner regulator actuated by the variable oil pressure in the oil-to-burner main.

Relation of Steam Pressure to Oil Pressure

If the curve of steam and oil pressure, as mentioned above, is a straight line, then the steam pressure is equal to the oil pressure multiplied by a coefficient plus a constant. At one plant this relationship was found to be such that the steam pressure at the burner was equal to the oil pressure times three, plus thirty; thus at rating the oil pressure was 20 lb. and the steam pressure was 90 lb.; at 50 per cent overload the oil pressure was 30 lb. and the steam pressure was 125 lb.; at half the load the oil pressure was 10 lb. and the steam pressure was 60 lb.

Figure No. 1 shows the steam-to-burner regulator designed to meet the above relationship. There are two diaphragms, one actuated by the pressure in the oil-to-burner main, and the other by the pressure in the steam-to-burner main. The fulcrum is adjustable to give the desired ratio factor; the yardarm contains an adjustable weight which takes care of the constant pressure difference such as the figure 30 lb. mentioned in one plant above. The movement of the yardarm controls a pilot valve in the small hydraulic cylinder, which in turn controls the chronometer valve supplying steam to the steam-to-burner main.

Fuel Oil Regulating System

While it is not the purpose of this article to describe in detail the Moore Automatic Fuel Oil Regulating System, it should be stated that the air supply is likewise controlled by a damper regulator in which

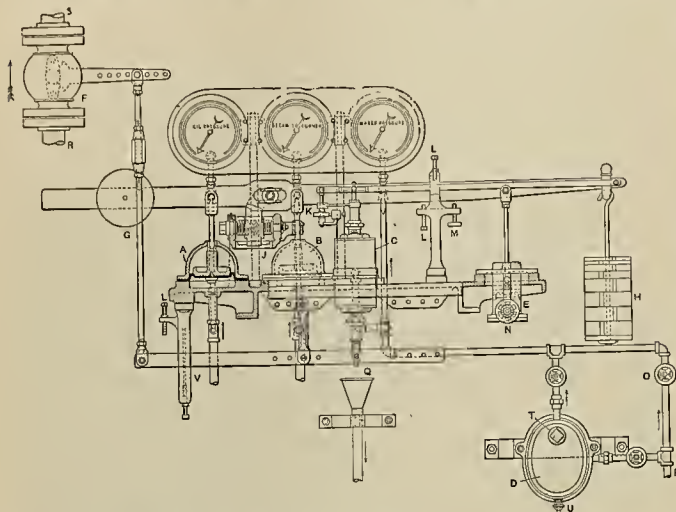
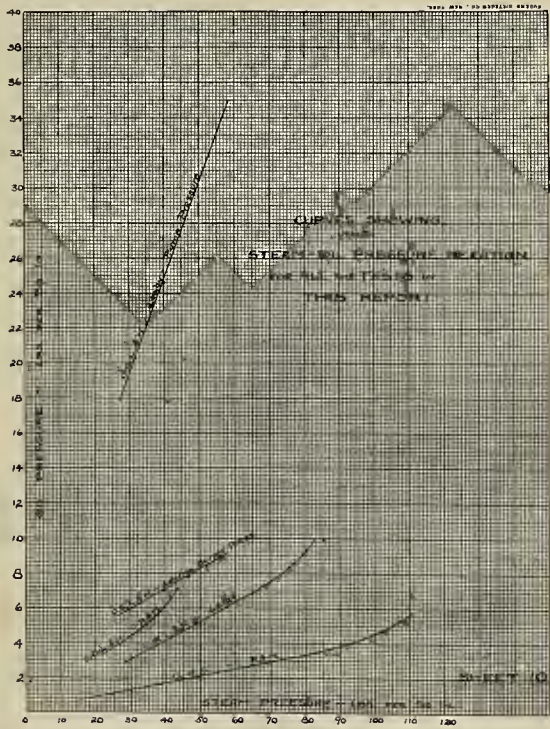


Fig. 1—The steam to burner regulator designed to meet the relationship determined between oil and steam pressure. There are two diaphragms, one actuated by the oil pressure, the other by the steam. The fulcrum is adjustable to give the desired ratio factor and the yardarm contains an adjustable weight which takes care of the constant pressure difference. The movement of the yardarm controls a pilot valve in the small hydraulic cylinder, which in turn controls the chronometer valve supplying steam to the steam-to-burner main.

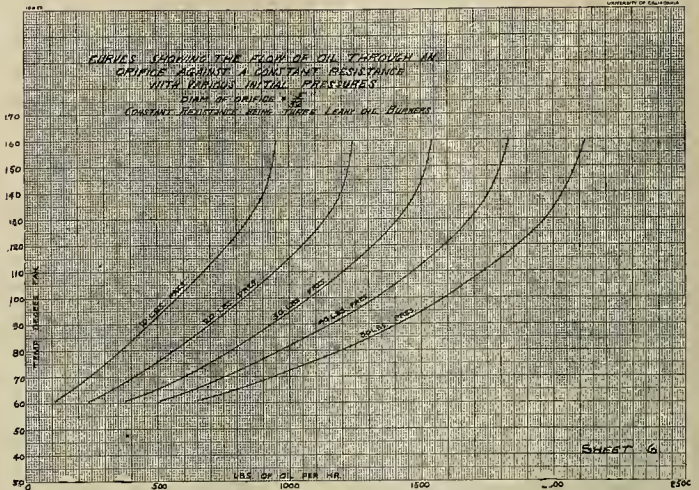
all boiler dampers are connected to a common rockshaft which in turn is moved by a hydraulic cylinder. The position of the rockshaft is determined by the oil pressure, the dampers being opened as the oil



Curves showing the steam-oil pressure relation for all tests here reported. Note that these curves represent practically straight lines.

pressure increases, coincident with an increase in load. On actual test of a hand-fired boiler it was found that the movement of the boiler damper was nearly proportional to the oil pressure, and that the deviation from this rule could be corrected by the

angularity of the damper rods, etc. The elements of the damper controller are, therefore, a diaphragm actuated by the oil pressure, a yardarm moved by the diaphragm, and a coil spring resisting this movement. It is thus evident that the movement of the



The influence of temperature on the flow of oil through an orifice against a constant resistance with various initial pressures.

yardarm is then proportional to the change in oil pressure; this movement is then communicated by means of a hydraulic cylinder to the main rockshaft, a differential control valve actuated by the yardarm regulating the pressure of water to the hydraulic cylinder.

In actual service the system is giving record performances for boiler efficiency over long periods.

For those interested in this system, a detailed description will be found in the Transactions of The American Society of Mechanical Engineers, Volume No. 30, an article entitled "Unnecessary Losses in Firing Fuel Oil and an Automatic System for Their Elimination."

Application on the Pacific Coast

It should be stated that the grade of oil now being used on the Pacific Coast, by reason of its lighter gravity, lower viscosity and higher average temperature of firing, exhibits flow characteristics differing from those shown by the above curves. It is possible, however, to adjust the Moore Automatic Fuel Oil Regulating System to accommodate these changes in characteristics of oil, and that just as favorable results for boiler efficiency are being secured with the present-day oil as when burning the crude oil of the grade used in connection with the above tests.

THE PRINTING TELEGRAPH

The printing telegraph came into extensive use in the United States during the period of the war when the demands upon the telegrapher were so heavy. The printing telegraph consists of a sending instrument equipped with a keyboard similar to that of a typewriter, and electrically connected with a receiving instrument in such a manner that the latter automatically reproduces what is typewritten on the sending instrument.

PRACTICAL LESSONS IN ELECTRICITY

BY H. H. BLISS

(Why different types of motors are used for different kinds of work, and the requirements and principle of operation of the various types are explained in this article; the eleventh of the series on practical electricity published in cooperation with the Extension Divisions of the Universities of California and Oregon. Additional material for the course is supplied by the universities.—The Editor.)

Direct Current Motors.—For operation upon d.c. circuits motors are built of three different types. They are known as series, shunt and compound motors, the names referring to the connection between the armature and the field winding, as in the case of d.c. generators. The magnet coils in a series motor consist of a few turns of large wire carrying

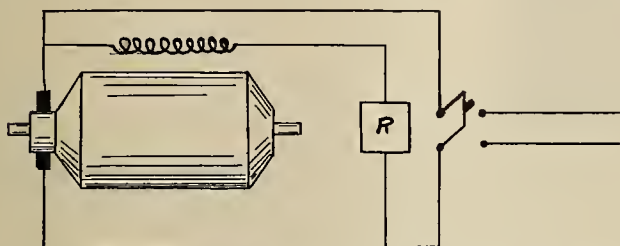


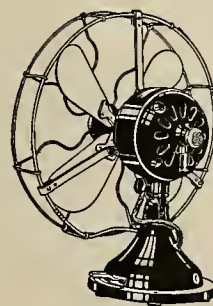
Fig. 1—Cutting down the field current in this shunt motor by means of the rheostat causes the armature to run faster. It must do this to keep the counter electromotive force nearly equal to the voltage of the line.

the whole current of the machine. A shunt motor has field windings of small wire and many turns, connected in multiple or shunt with the armature. Both series and shunt coils are put upon the field of a compound motor.

The "torque" or turning effort of a motor depends upon the strength of the magnetic field and hence is proportional to the field current except for the disturbing effects of saturation and armature reaction. Therefore, decreasing the field current to half value cuts the torque approximately in two. This is on the assumption that the current in the armature remains constant, for the torque is directly proportional also to armature amperes. Then in a

series motor, where the same current flows through armature and field, triple current would give nine times the torque were it not for the disturbing factors mentioned above. (On test a certain 500-volt machine was found to give with 60 amperes five times as great a torque as with 20.)

Series motors are used for electric railways, hoists, cranes, etc. When a street car starts up-hill from the level the motors at once lose speed and the counter e.m.f. decreases. More current is thus permitted to flow and this raises the torque of the motors sufficiently to carry the increased load. This flexibility in regard to torque and speed is what

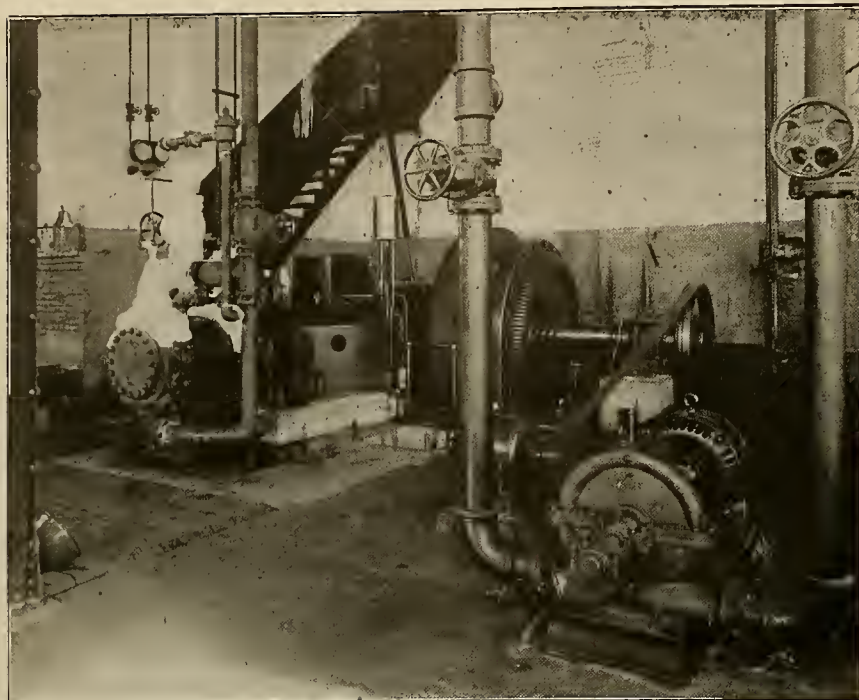


This direct current G-E fan runs at 1500 r.p.m. When the fan blades are removed, the motor runs at about 3500 r.p.m. Is the field shunt, series, or compound wound?

makes the series d.c. motor the most convenient for all such applications as hoisting and traction where heavy and variable loads must be frequently started and stopped. It is necessary to keep a series motor coupled to its load, however, and to control it carefully, for if the load is removed the speed will run



The induction motor driving a wood saw. This small machine runs at 1200 r.p.m. when unloaded, and is rated at 5 hp. Can you guess the number of poles and frequency of the alternating current supply?



Refrigeration plant run by electric drive. In Southern California this large motor runs at 200 r.p.m. on 50-cycle current and drives an ammonia compressor. How many poles on the revolving field of the motor?

very high, possibly ruining the armature by centrifugal action.

Shunt Motors.—When a shunt motor is operated without a load it does not run faster than a certain speed, behaving like a steam engine with a governor, in contrast to the series motor which acts like an ungoverned automobile engine. At the “no load speed” of a shunt motor it develops a back e.m.f. almost equal to the applied voltage, so that only a small current can flow. A slight increase in the speed would raise the back e.m.f. so high that no current could enter the armature and the machine could take no power from the line.

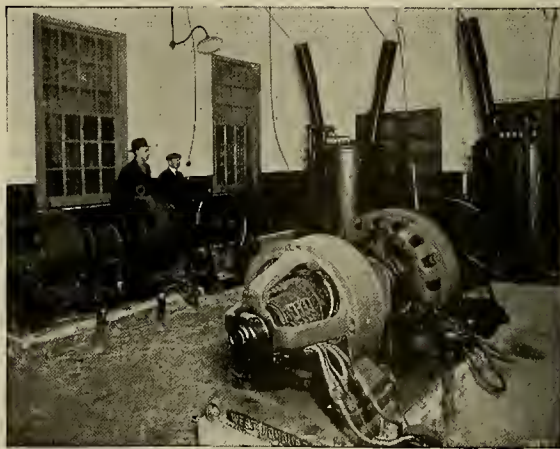
When a shunt motor is required to drive a load it must absorb more watts than when running idle. Suppose 100 volts applied to the armature and the back e.m.f. at no load equals 99. The net voltage driving current through the armature is, then, 1 volt, and the current will be 10 amperes if the resistance is 0.1 ohm. If a load is then applied which requires an input of 4 kw., the current must rise to $4000 \div 100$, or 40 amperes, which means that the net voltage must be $40 \times 0.1 = 4$. The back e.m.f. must drop to 96 volts, which means that the speed must drop to 96/99 of the no load speed. At full load a shunt motor runs about 5% slower than at no load.

It is often desirable to run a shunt motor at other than normal speed. In a machine shop, for instance, a motor driven lathe should have several available speeds suitable for different jobs. There are four ways of accomplishing this: (1) By installing a multivoltage system; (2) by rheostat control of armature current; (3) by changing the field flux mechanically; (4) by rheostat control of the field current.

With two or more generators one can apply to the motor armature different voltages and obtain speeds in proportion. The field strength may be kept constant by using always the same voltage for excitation. A similar effect may be obtained by put-

ting a rheostat in series with the armature and thus lowering the applied e.m.f. by means of the voltage drop. This method is wasteful of power, while the first is expensive and complicated.

Weakening the field of a shunt motor by moving the poles and armature farther apart or by putting resistance into the exciting circuit changes the speed (see Fig. 1). Suppose the unloaded 100-volt motor considered above had its field weakened 7% — what alteration in speed would occur? The back e.m.f. would instantly fall to about 92 volts and a large



A Westinghouse motor-generator set run by direct current and producing alternating current. This last is raised to high voltage by means of transformers and then “rectified” for use in precipitating dust in flue gases.

current would flow ($8 \div 0.1 = 80$ amperes). This would produce a strong torque and speed up the armature until the back e.m.f. reached approximately its former value. Weakening the field increases the speed.

Compound Wound Motors.—Some motors have a series winding in addition to the shunt coils on the field poles. Imagine current supplied to a compound generator, entering at the positive (+) terminal (from which the current was sent out when the

machine was generating). Would the series field help or oppose the shunt field, and which way would the armature rotate? The current would flow in the old direction through the shunt coil (from the + to the — brush), but in the reverse direction through the series coil. Hence the field will be weakened by the series coil. The armature will rotate in the old direction, for it must produce an induced e.m.f. opposing current, and hence directed out at the + brush. When a load is put upon this motor the increased current in the series coil tends to weaken the field and hence to increase the speed. Thus a compound motor can be arranged to have a constant speed with varying load.

A "cumulative compound winding" is produced when the series coil is connected the opposite way, so as to assist the shunt coil. Such a winding gives a strong torque at starting, due to the heavy series current and the strong field it produces. An increase of load in such a machine causes the speed to drop more than with a simple shunt winding, as the increase of current strengthens the field. Such a characteristic is desired for such machines as punch presses, shears, etc. These motors with various degrees of compounding are used also for elevators, rolling mill machinery, etc.

Alternating Current Motors. — A synchronous motor runs at a constant speed which is determined by the number of poles and the frequency with which the supply current reverses its direction. Adding or

taking off the load changes the number of amperes, and varying the field strength changes the "phase relation" of the supply current, but the motor runs at constant speed unless the load is heavy enough to make it "fall out of step" and come to a standstill.

Induction motors without load run at nearly synchronous speed. This can be calculated from the number of poles and the frequency of the supply circuit. For "60 cycle current" the revolutions per second = $60 \div \text{no. of pairs of poles}$. Thus a 6 pole motor makes 20 revolutions per second or 1200 r.p.m. unloaded. The 50 cycle current used in Southern California drives a 4 pole synchronous motor at 1500 r.p.m.

As the load on an induction motor is increased its speed decreases, the "slip" varying from practically zero to 5% or more. Some motors, specially built with high resistance rotors, have a slip of 10 or 15%. Such machines are used for driving the rolls in steel mills and similar work where the load is heavy and intermittent. With a punch press, for instance, such a motor can speed up and deliver energy to a heavy flywheel during the interval between operations, and then slow down to give the flywheel a chance to do much of the work of driving the punch. A constant speed motor would be of very little value for such applications for it would be very heavily overloaded part of the time and idle for the remainder. The cumulative compound d.c. motor and the induction motor with large slip are much used with flywheels for this class of work.

The Electric Furnace in Practice

BY CARL H. BOOTH

(That an electric arc type furnace can be successfully operated in the melting of metals without the use of special electrical appliances and equipment is indicated by the satisfactory results obtained from the small furnace described below. This can be operated on the ordinary 110-volt single phase service obtained from most public service companies. The author is president of the Booth-Hall Company of Chicago, Ill.—The Editor.)

An electric furnace of the arc type which will enable a ton of metal to be charged, melted and poured in $7\frac{1}{2}$ to 8 hours, has been successfully designed and operated by the Booth Hall Company of Chicago, Ill.

Mechanical Details —

The furnace rotates on rollers, and is carried by two cylindrical tracks. The rollers are driven by a motor, so as to rotate the shell at a speed of two revolutions per minute. No gearing is required encircling the furnace. The current is carried to the electrodes by means of short pieces of flexible cable, which connect to the above-mentioned track by means of shoes which press against them and form a sliding contact. The electrodes are regulated by means of screws, and on small furnaces are entirely hand-operated; but on the larger furnaces automatic control is used, thus doing away with the necessity of close watching on the part of the operator.

In the small furnaces the door is in one end only, but in the larger furnaces both ends are provided with a door.

Lining —

Probably the most important of all factors in reliable and efficient furnace operation is the lining. Especially is this true with the melting of non-ferrous metals, where a lining with many joints will have a decided tendency to absorb metal. In order to overcome this difficulty the lining provided with the Booth furnace is made with as few joints as possible.

The special brick lining is backed up with a layer of heat insulating material, so that when the furnace is at working temperature, the temperature on the outside of the shell is so that the hand can be placed upon it.

Operation —

In starting the furnace the tap hole is plugged with molding sand, the charge placed in the furnace, the door closed and the power thrown on. The electrodes are then brought together and the amount of current flowing regulated by moving the electrodes closer together or further apart, as indicated by the meter on the switchboard.

As the furnace is sealed up quite tightly from

the time the power is on until ready to pour, very good results as to metal temperature have been obtained by keeping the power practically constant for a definite length of time. After the operator has poured a few heats, it is possible for him to determine the right temperature practically every time without opening the door and inspecting the metal.

In pouring the furnace, the pipe stands which carry the water connection simply lift out of the way without it being necessary to unbolt anything, and

used, machined and equipped with what is known as nipple joint. These are 30 inches in length. The electrodes enter the furnace through graphite sleeves. This opening is also protected by a water-cooling copper casting which serves to protect the electrodes from burning at this point.

Even with the small 250-lb. furnace shown, the electrode consumption is low. If the furnace is kept in operation fairly continuously during an 8-hour day, the consumption will average about 3 lbs. per ton.

On small furnaces of the size described, one furnace operator can conveniently handle three furnaces without the use of automatic electrode control.

Advantages —

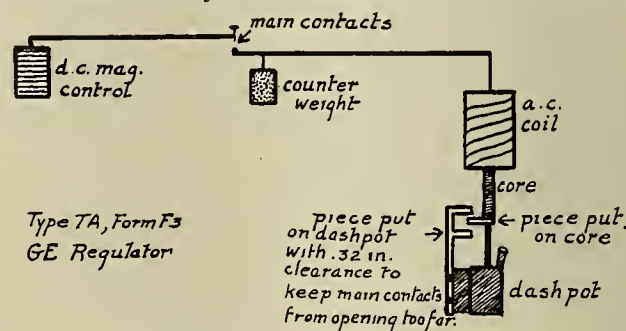
Simplicity in design, economy in handling and pouring and ease in making lining repairs are particular features of the furnace. The absence of overhanging cables and the simplicity of the electrical connections make expert operation unnecessary, while the complete rotation of the furnace results in more even wear on the lining, a greater absorption of heat by the metal, and improved power consumption. These factors help to bring down the cost of melting and upkeep charges.

LEADING POWER FACTOR CAUSES TROUBLE

BY M. F. ROBERTS

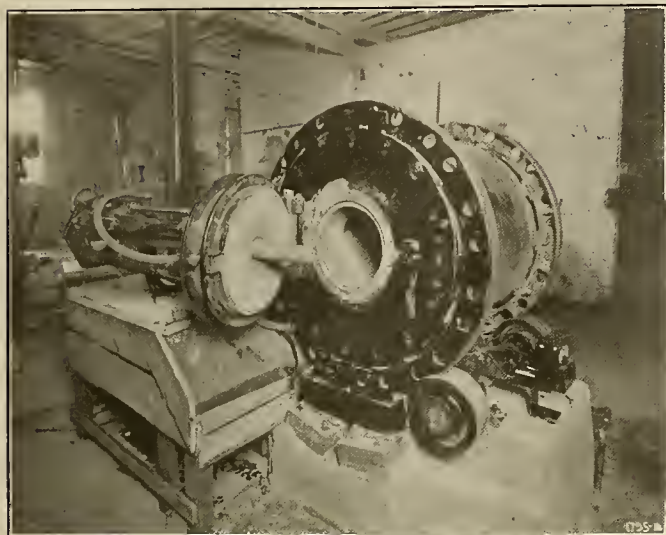
(Certain difficulties experienced by a central station in connection with a leading power factor were overcome by a device described below, designed to prevent the loss of exciting current consequent on variations in power factor. The plan, which will doubtless be of interest to others, is described here by the Power Plant Engineer of the Union Pacific Coal Company at Rock Springs, Wyoming, where it has been successfully tried out.—The Editor.)

We carry an average of 85 to 90% lag power factor, during our day peaks, until 4 p. m. About 9 p. m. the night peak comes on with the power factor rising up to 90% power factor load; at different times the synchronous motors on the circuit



An ingenious device applied to the a.c. magnet core which prevents difficulty in the dropping of the load due to a lag on the part of the regulator

furnishing exciting current, instead of the station exciters. As the power factor drops back to unity, our regulator, not being quick enough to close its main contacts, causes us to lose our exciting current and to drop our load. This causes considerable inconvenience to all concerned as we supply four other towns with power besides Rock Springs. To remedy the trouble our electrical engineer, D. C. McKeehan, has put a stop on the alternating current magnet core to prevent main contacts from dropping too far apart thus preventing the losing of the exciting current.



Rear view of 250-lb. Booth Electric Brass Furnace in the foundry of Leietl Brothers, Chicago, showing charging door open ready for charging. Note the lining of the furnace, and the door made of one solid piece of brick.

the men can go right up to the furnace with the ladle.

When the furnace is ready to tap the operator stops the rotation until the tap hole is above the level of the holder, and thus above the surface of the metal. The tap hole is then opened by means of a sharp pointed steel rod. As the tap hole is simply plugged with molding sand there is no sledging or pounding required. After the tap hole is opened, the furnace is rotated down until the opening is below the surface of the metal, and the metal poured out into the ladle. If it is desired to only remove a portion of the metal, the furnace is again rotated back and the tap hole brought above the level of the metal in the furnace.

In melting ingots and heavier brass scrap, a heat will average from 30 minutes to an hour in length of time, depending upon the kind of metal poured and the size of the charges. A 300-lb. charge of copper ingots requires about an hour to melt and pour, while a 300-lb. charge of yellow brass requires about 40 minutes. The shrinkage with yellow brass ingots averages about 1 per cent and on red brass and high copper bronze, under 1 per cent. With the furnace hot the power consumption will run from 250 to 350 kw-hr. per ton.

Electrode Consumption —

With furnaces of this type the graphite electrode is to be preferred, due to its greater conductivity, which permits the use of the smallest size of electrode practicable for the current to be carried. On this furnace electrodes of 2½ inches diameter are

SPARKS—Current Facts, Figures and Fancy

(Catching grasshoppers, milking cows, and feeding chickens, is all done by machinery now; the idle wind has been set to work building roads, the correspondence between England and Cologne is so active that an air mail has been instituted, and the wireless telegraph systems in the United States handled about 450,000 messages during 1917. Only the rats seem to be unimpressed by the general anti-time-wasting movement.—The Editor.)

A tank car built by a European railroad for transporting living fish long distances has an electric motor which keeps the water aerated.

* * *

It is estimated that some 450,000 messages were handled during 1917 by the United States wireless telegraph systems—an increase of about 58 per cent over those for 1912. The total income for 1917 aggregated \$1,385,060, a gain of 107 per cent over 1912.

* * *

It looks as though the cows in some countries have been affected by the prevailing epidemic of strikes: recent figures show that the United States exported 553,000,000 pounds of condensed milk in 1918 as against a normal 21,000,000 a few years previously.

* * *

Bricks can be almost as painful as shrapnel and for this reason an American city has provided its policemen with metal helmets similar to those worn in the trenches. This thoughtful action on the part of the city authorities is not intended to reflect in any way upon the dispositions of the inhabitants.

* * *

"He's from the country" ought to be uttered in tones of awed admiration these days. According to recent figures there are 118 applications of electricity on the farm; and there are at present in use in the United States some 5,000,000 motor cars, over half of which are owned and operated by the farming population.

* * *

Somebody harnessed a volcano for power purposes; the latest is making the wind build roads. In the New Mexican desert country a highway some nine miles long was recently constructed simply by making a trench through the sand, extending it down to the clay bottom and letting the desert winds do the rest.

* * *

A frost barrage was one of the weapons used in fighting the recent great oil-plant fire at Bayonne. When the flames were already threatening the entire plant, chemists emerged with an apparatus throwing a spray at a temperature far below zero between the flames and the piled-up oil barrels, effectively checking the fire and saving both life and property.

* * *

The air mail from England to Cologne is growing rapidly. It was inaugurated in the early part of this year with four aeroplanes carrying 25 bags of mail between them, and within three months over

three thousand bags had been carried. Correspondence leaving Cologne one morning is delivered to all parts of England and Wales from Folkstone by the first delivery on the following morning.

* * *

Catching grasshoppers by vacuum-cleaner is a possibility suggested by the latest diversion of a middle-western farmer. This enterprising gentleman patrols his fields with a funnel device, like a megaphone on wheels, which inhales grasshoppers. A motor driven fan near the mouth creates suction which draws the grasshoppers down into a detachable box, and a revolving brush keeps the passage clear. The day's catch is turned over to the chickens.

* * *

Rats are sensational animals. We have heard of them being responsible for plagues, devouring several hundred dollars' worth of paper money, and doing other dramatic and expensive things; the latest claimant to fame has turned in a fire alarm by gnawing at the lead sheathing in a street cable system and causing an intermittent short circuit to earth. The fire brigade turned out with admirable promptness; their subsequent comments are not recorded.

* * *

The farmerette feeding a flock of chickens is a picturesque sight dear to the heart of the artist, but the modern poultryman is utilitarian enough to spoil it by feeding his chickens by machinery. Iron tanks are attached to the ceiling of the hen house, tapering almost to the floor. A time clock starts a motor which in turn revolves a short vertical shaft within the tank, opening the door at the bottom of it and dropping the feed onto a swiftly revolving paddle. This scatters the feed in all directions over a wide area. A mixing barrel on the floor above keeps the tanks supplied.

* * *

What is said to be the largest airplane engine in the world has recently been put under its first test at the "Sunbeam" Works at Wolverhampton, England. It is reported to be of 1,000 nominal horsepower, developing about 900 horsepower at normal working speeds. It was not run at full power on the first trial, and is now being dismantled for examination, after which it will be reerected for a full-power test. The engine has 12 cylinders arranged "V" fashion, and weighs less than 2 pounds per horsepower. Special airplanes are to be built to suit the engine, while it is also probable that it will be fitted to some of the later giant airships. It is stated that the biggest airplane engine previously made was an Italian production.

PERSONALS

E. M. Cutting, formerly Pacific Coast manager for the Edison Storage Battery Company with headquarters at San



Francisco, has been appointed manager of the company's railroad department with headquarters at Orange, N. J. Mr. Cutting expects to leave the coast early in September to take up his new duties, for which his previous experience admirably qualifies him. Entering the employ of the Southern Pacific Company's signal department in 1888, he rose to the position of signal supervisor for the western division by 1897. In 1905 he

was also given charge of the car-lighting on the Southern Pacific lines and in 1908 became engineer of train lighting, heating and ventilation. In 1912 he resigned to become Pacific Coast manager of the Edison Storage Battery Company. "Uncle Ed," as he is affectionately known from coast to coast, has always taken an active interest in electrical affairs, having been instrumental in initiating the movement which culminated in the Association of Railway Electrical Engineers, of which he was the second president, and also being a past president of the San Francisco Electrical Development League. While his many friends on the Pacific Coast will be pleased to learn of his newest advancement, they cannot but feel a deep regret at his withdrawal from the Pacific Coast field.

John R. Freeman, electrical engineer of Providence, R. I., is one of San Francisco's recent visitors.

J. J. Duffy, electrical engineer of Providence, R. I., is among recent eastern visitors to San Francisco.

V. S. McKenny of NePage-McKenny Company, electrical engineers and contractors, Seattle, is spending his vacation on Vancouver Island.

J. Sandberg, chief engineer, Stavanger Electric Power Supply of Stavanger, Norway, is inspecting the hydroelectric power plants of California.

H. H. Jones, general manager of the Consolidated Gas & Electric Company of San Diego, has recently been spending some time in San Francisco.

Philip Forve, president of the Forve-Pettibone Gas and Electric Company, Los Angeles, has been spending some time in San Francisco. Mr. Forve was accompanied by his wife and family.

T. Arosin, who has been engaged in power construction work in Portland, Oregon, has been transferred to Isleton, California, where he takes the position of station operator of the Great Western Company's plant.

J. J. Agutter of J. J. Agutter & Company, Seattle, electrical engineers and contractors, is attending the national rifle and revolver shoot being held at Caldwell, New Jersey. He is a member of the Washington team.

R. H. Dearborn, professor of electrical engineering at Oregon Agricultural College, has recently returned from an extended eastern trip on which he visited several large power plants with a view to gaining the latest ideas along this line.

Roy J. Heffner has been placed in charge of technical instruction for the Extension Division of the University of California. H. H. Bliss, familiar to readers of the Journal of Electricity as having this position, will in future confine all his activities to teaching and lecturing for the Extension Division.

J. C. Clark, professor of electrical engineering at Stanford University, will take a sabbatical year's leave of absence from the university in the employ of the General Electrical Company. He has gone east to spend the next few months in the Pittsfield works.

J. E. Crilly has resigned his connection with the National Conduit & Cable Company of California to become Pacific Coast representative of the Habirshaw Electric Cable Company. Mr. Crilly will make his headquarters with the San Francisco office of the Western Electric Company.

N. S. Braden, former sales manager, has just recently been elected vice-president of the Canadian Westinghouse Company, Ltd., of Hamilton, Ontario. H. M. Bostwick, assistant sales manager, has been appointed sales manager, to fill the vacancy created by Mr. Braden's promotion.

C. H. Talmage, local manager of the Western Electric Company, Salt Lake City, C. B. Hawley of the Intermountain Electric Company and Randall Myer of the Capital Electric Company, both of Salt Lake City, have been spending a short time in San Francisco on their way to attend the Jobbers' meeting at Del Monte.

Dr. T. M. Putnam, professor of mathematics and dean of the undergraduate division in the University of California, has been given the additional title of acting dean of the College of Letters and Science by the State University Regents. The position of dean of the College of Letters and Science, held by the late Prof. H. Morse Stephens, has been unfilled since his death on April 16.

Captain W. S. Wyche of the Second Engineers, U. S. A., has returned from overseas and rejoined the Arkansas Valley Railway, Light and Power Company, Victor, Colorado. Captain Wyche was twice honored for bravery in action. Once he was decorated with the Croix de Guerre with palm conferred by Marshal Petain, and once he received a special enlarged citation from General Pershing.

Dr. F. H. Newell, head of the Civil Engineering department of the University of California, and president of the American Association of Engineers, was the principal speaker at the state convention of Technical Engineers of Utah at their annual meeting held in Salt Lake City, August 14, 15 and 16. Dr. Newell has since been spending some time in San Francisco, where he addressed an engineering gathering on "The Engineer in Modern Life: His Needs and Ideals."

J. H. Moseley, formerly with the managerial staff of the Journal of Electricity and more recently a captain in the United States Signal Corps, has accepted a position with the American International Corporation, export organization, as New York manager of the G. Amsinck & Company of Mexico. In his recent work in the advertising department of the Western Electric Company, Mr. Moseley has accomplished some very excellent work in disseminating ideas of helpfulness to the contractor-dealer. One of his excellent articles entitled "Building with Advertising" will appear shortly in the columns of the Journal of Electricity.

Major Allen E. Ransom has joined the Westinghouse Electric International Company as special representative in

the west coast of South America with headquarters at Valparaiso, Chile. Major Ransom, who was well known to Pacific Coast engineers as sales engineer with the Seattle office of the Westinghouse Company, and later with other machinery interests, has just returned from France, where as chief electrical engineer for the St. Nazaire base and later as major commanding the 137th



engineer battalion he had a wide and varied experience.

Charles G. Du Bois has been elected President of the Western Electric Company, to succeed H. B. Thayer, who has resigned after 38 years of service to assume the presidency of the American Telephone and Telegraph Company.



After his graduation from Dartmouth College in 1891, Mr. Du Bois joined the Western Electric Company in New York, as a clerk in the accounting department. As Secretary of the Company, a position to which he was elected in 1898, Mr. Du Bois had the general supervision

of the entire accounting system of the Western Electric Company, and in this connection was largely instrumental in working out and securing the adoption of the Company's first pension plan.

In 1907 Mr. Du Bois was transferred from the Western Electric Company to the American Telephone and Telegraph Company as its comptroller. In October, 1918, after having served for a period as comptroller for the American Red Cross, Mr. Du Bois rejoined the Western Electric Company as vice-president, which office he held until his accession to the presidency.

E. J. Fentress, formerly local representative for the Chicago Fuse Company at San Francisco, has joined the sales force of H. B. Squires Company.

Arthur B. Reynders, former director of production of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa., has recently been made works manager of the company's East Springfield plant. Mr. Reynders has been with the Westinghouse Company since 1899. He is succeeded as director of production by A. E. Kaiser, who has been assistant to the director of production since 1912.

E. N. Brown, president of the Majestic Electric Development Company with headquarters in San Francisco, has just returned from a six weeks' trip through the East, and after discussing conditions with branch managers at Kansas City and Philadelphia, and spending some days in Washington, New York and other centers, anticipates continued uncertainties in most markets over prices and material supply, but feels warranted in making plans for a business this year of at the very least 100% increase over last year's business. This speaks pretty well for a California industry that has developed into a world-wide scope in a few years.

J. H. Fagg of the Pacific Gas & Electric Company, Stockton, Cal., and his family have been enjoying two weeks of camping and fishing in the Sierras. Mr. Fagg is here shown operating his own public utility installation and latest reports state that, while the utility is not as yet on a paying basis, he has a tremendous lot of enjoyment in this new business diversion during vacation days in the high Sierras.



Major Chas. E. Sholes, recently elected vice-president of the Edison Storage Battery Company, has returned to Orange, N. J., after presiding at a meeting of district managers on the Pacific Coast, held at San Francisco.

A LETTER TO THE PUBLIC POLICY COMMITTEE, N. E. L. A.

Gentlemen:—

As Chairman of the Public Policy Committee of the National Electric Light Association, I wish to discuss with the members of that Committee the policies deemed essential by me to be pursued during the coming year.

First and foremost, I am in sympathy with, and ready to stand back of all the plans which have been suggested by Mr. R. H. Ballard, President, and pledge myself to support him in his more than laudable effort to make his administration year a record one for the Association. I hope that the members of our Committee will assist Mr. Ballard in securing men of prominence in the industry for chairmen and members of several new general committees he is trying to organize to work out the big problems confronting us. These will require the thought of some of the best minds and work of the best men.

We of the West want the East to know us better. We want to expand the usefulness of the Association; we want it to be nation-wide in its influence.

The fundamental policies which must govern the attitude of public utilities should be alike. In my judgment this can best be accomplished through the suggestions made by our President, particularly with reference to the formation of Geographic Sections.

The methods of approach to the rate regulating bodies must be upon sound principles of equity. Individual opinions enforced through argument in special cases should not be permitted to raise questions inimical to the public utilities as a whole.

The East has never been appreciative of the necessities of water power development; it has been more or less inactive in support of Western needs and conditions. This condition must be remedied.

Standards should not be encouraged in one section of the country that might be detrimental to other sections. In this concert of action is necessary.

The Public Policy Committee should be a judicial body acting upon the general questions raised in the Association and coming through the avenues of the different committees. For that reason it should be closely in touch with the action of all committees, but more especially the Executive Committee, and should have intimate knowledge of what is being discussed and of the problems that concern each of the subdivisions of the organization. I have arranged with the President that copies of the minutes of the Executive Committee meetings will be sent to each member of the Public Policy Committee.

If ever there was a time in the history of our Association when to overcome the insidious working of antagonistic interests we should stand together, that time has now arrived.

National legislation and state legislation should be correlated with the needs of all states, so as not to form dangerous precedents. Matters of this kind can best be worked out through the agency of such a committee as the Public Policy Committee.

I want each and all of you to pledge yourselves to a shoulder-to-shoulder campaign with our President. Like the West from which he comes, he is progressive, ambitious and resourceful.

I am sending a copy of this letter to you, to each of the vice-presidents, and invite from you and them such suggestions of matters to be considered at the meeting of the Public Policy Committee to be held in September as may occur to you as things that should receive consideration at the hands of that Committee in line with the policies which I have outlined in the preceding paragraphs.

Yours very truly,

JOHN A. BRITTON, Chairman.

Meeting Notices for Electrical Men

(An important item in this week's activities is the postponement of the Northwest Electric Light and Power convention, announced on page 229. The vacation period being now practically over, organizations are again very active, notably the National Electric Supply Jobbers' Association which has just held its quarterly gathering at Del Monte.—The Editor.)

American Institute of Electrical Engineers

The Pacific Coast Convention of the American Institute of Electrical Engineers, scheduled to take place in Los Angeles, California, September 18-20, 1919, will be held under the auspices of the local section, and vice-president John B. Fiskien of Spokane, Wash., has accepted the invitation to preside at the convention sessions.

The program arrangements are not yet completed, but the following technical papers will be among those presented:

"Order and Amplitude of Harmonics in Voltage Wave Forms with Indicating Instruments," by Leslie F. Curtis.

"Theory of Probabilities Applied to Failures of Suspension Insulators," by L. M. Klauber.

"Predetermination of Synchronous Phase-Modifier Performance," by Hubert V. Carpenter.

"Operating Features of a 1000-Mile, 220,000-Volt Transmission Line," by R. W. Sorenson, H. H. Cox and G. E. Armstrong.

In addition to this the Entertainment Committee also promises a splendidly arranged program. The whole convention will have distinct social attractions as well as vitally important technical features.

Committee on Railway Electrification, San Francisco

A. I. E. E.

The sixth meeting of the Committee on Railway Electrification was held on August 15th, 1919, at the Engineers' Club, San Francisco, California. Messrs. Woodbridge, Sibley, Fowler, Dodge (representing Mr. Ready), Jollyman, Baum and Cone were present.

Concerning a paper by Mr. R. Beeuwkes for the forthcoming Los Angeles A. I. E. E. convention, a letter was read from Mr. Beeuwkes. This letter sets forth the impracticability of publishing additional data of the Chicago-Milwaukee electrification for the present.

The question of a report by this committee to the September A. I. E. E. convention was then taken up. It was agreed that such report should consist of:

1. General section, giving an outline of the program of the Committee, with such items as can be obtained from the work of the several sub-committees, and

2. An illustrated paper on the water power resources of California, by Mr. Fowler, giving results of his work on the preliminary report of sub-committee No. 2.

It was agreed that if practicable the report for the A. I. E. E. convention would be published in the Journal of Electricity for September 15th, 1919. A motion was carried designating the chairman, vice-chairman and secretary as a committee in charge of the report.

The meeting adjourned to convene September 26, 1919, at 1:00 p.m. at the Engineers' Club.

A. I. E. E. Committee Appointments

At the first meeting of the Board of Directors of the Institute for the administrative year beginning on August 1, 1919, held in New York on Tuesday, August 12, 1919, President Townley appointed committees for the administrative year beginning August 1, 1919.

The Chairmen of the committees appointed are as follows:

Finance, N. A. Carle, Newark, N. J.; Meetings and Papers, W. I. Slichter, New York; Editing, Henry H. Morris, New York; Board of Examiners, F. L. Rhodes, New York; Sections, W. A. Hall, Lynn, Mass.; Student Branches, C. Francis Harding, Lafayette, Ind.; Membership, R. W. Krass, New York; Public Policy, H. W. Buck, New York; Headquarters, N. A. Carle, Newark, N. J.; Committee on Technical Activities, Wilfred Sykes, Pittsburgh; Standards, L. T. Robinson, Schenectady, N. Y.; Power Stations, Philip Torchio, New York; Transmission and Distribution, E. B. Meyer, Newark, N. J.; Traction and Transportation, W. S. Murray, New York; Industrial and Domestic Power, A. G. Pierce, Pittsburgh; Lighting and Illumination, C. E. Clewell, Philadelphia; Economics of Electric Service, William McClellan, Philadelphia; Protective Devices, D. W. Roper, Chicago; Electrochemistry and Electrometallurgy, E. F. Northrup, Princeton, N. J.; Electrophysics, F. W. Peek, Pittsfield, Mass.; Telegraphy and Telephony, Donald McNicol, New York; Marine, Arthur Parker, Camden, N. J.; Use of Electricity in Mines, W. A. Chandler, Uniontown, Pa.; Electrical Machinery, B. A. Behrend, Boston; Instruments and Measurements, S. G. Rhodes, New York; Iron and Steel Industry, W. F. James, Philadelphia; Educational, J. C. Parker, Ann Arbor, Mich.

BUILDERS OF THE WEST — LV



LEONARD F. FULLER

In no field of scientific achievement emphasized by the war have more epoch-making results been achieved than in the field of radio telegraphy. Spanning vast distances and revolutionizing intercommunication on land and sea, this science has opened up possibilities undreamed-of a few years ago, and has brought still nearer the pan-Pacific ideal of the West. To a western man goes the honor of having made the greatest single contribution to the development of long-distance transmission in radio telegraphy: to Leonard F. Fuller, therefore, whose work with the Federal Telegraph Company of Palo Alto, California, has won for him the highest academic honors as well as nation-wide recognition, this issue of the Journal of Electricity is affectionately dedicated.

In accordance with the by-laws of the Edison Medal Committee the Board confirmed the appointment by President Townley of three members of that committee for terms of five years each, namely:

Messrs Edw. D. Adams, New York; H. H. Barnes, Jr., New York; and Benjamin G. Lamme, Pittsburgh. The Board also elected three of its own membership as members for terms of two years each, namely, Messrs, Wilfred Sykes, Pittsburgh; W. A. Hall, Lynn, Mass.; and G. Facioli, Pittsfield, Mass.

San Francisco Association of Electrical Contractors and Dealers

In our issue of August 15th an account was given of recent proceedings of the San Francisco Association of Electrical Contractors and Dealers with quotations from the revised by-laws. This account, owing to an editorial error, appeared under the heading "California Association of Electrical Contractors and Dealers." We hereby extend our very sincere apologies to the local association and trust that this explanation will help to clear up any inconveniences which may have resulted from the mistake.

Oregon Association of Electrical Contractors and Dealers

The regular meeting of the Oregon Electrical Contractors' Association for District No. 1 was held in the executive offices Monday evening, July 28th. The meeting was called to order by Chairman Kenney at 8:10 p.m.

The question of officers and the position of secretary were discussed, the matter being left, however, in the hands of the Executive Committee.

The question of the advisability of trying to form a fixed opinion regarding prices of certain articles which were more or less standard came up for consideration. The policy was disapproved and the recommendation made that the Association confine itself to the discussion of costs, overhead and reasonable profit, permitting individual action in the matter of establishing a price on any and all commodities. Attention was called to the fact that possibly misunderstanding had arisen in connection with this and it was necessary to call the particular attention of all the members to this policy.

At the regular meeting held on August 11th, Chairman Kenney presiding, the roll call was as follows:

J. C. English Co.	M. J. Walsh Electric Co.
Pierce Tomlinson Electric Co.	Morrison Electric Co.
Jaggard-Sroufe Co.	Scott Electric Co.
Nepage McKenney Co.	Vanderlip & Lord
E. L. Knight & Co.	F. A. Bauman & Co.
R. N. Lewis Electric Co.	R. W. Larsen
Portland Elec. Maintenance Co.	Smith McCoy Electric Co.
National Electric Co.	

The Executive Committee through R. C. Kenney, chairman, reported that H. C. Jones had been secured as secretary on a part time basis and that the headquarters office would be moved at once to 306 Concord Building.

J. R. Tomlinson, delegate to the National Convention at Milwaukee, gave a most interesting and instructive report regarding the things accomplished at the convention.

The application of R. W. Larsen for membership, 608 McKay Building, as a Class A member, was read and accepted.

A communication from Assistant Secretary of War, Arthur Woods, regarding citations for employers agreeing to reemploy army or navy men, was read and the secretary was instructed to apply for citations on behalf of the membership.

The labor problem was then taken up for discussion, principally the demand of the men for one dollar per hour. Mr. Green spoke in favor of submitting the labor proposition to the State Labor Conciliation Board and presented a resolution for discussion and signatures of members if approved. The resolution read as follows:

"We, the undersigned, electrical firms of the City of Portland, recognizing the necessity of paying an adequate wage to our employes, do hereby agree to submit the wage question to the State Board of Conciliation, agreeing likewise to abide by their findings."

It was moved, seconded and carried that the resolution be adopted by the Board, and that a committee of five with R. C. Kenney as chairman be appointed to handle the matter of labor adjustment and secure signatures of members not present. Mr. Kenney thereupon appointed the following on the committee: McCoy, Green, Sroufe and Fouch.

San Francisco Electrical Development League

The San Francisco Electrical Development League will resume its weekly luncheons this month. The first meeting will be on Monday, September 8, and it is hoped that there will be an especially large attendance.

California Association of Electrical Contractors and Dealers

A monthly meeting of the state Association of Electrical Contractors and Dealers was held on August 29th in San Francisco. Manufacturers and their representatives and jobbers and their salesmen were invited to attend this meeting.

Engineers' Club of San Francisco

At the meeting of August 21st John R. Freeman addressed the Engineers' Club of San Francisco on the subject of the Grand Canal of China.

The club had as its luncheon guest the following week Dr. F. H. Newell, president of the American Association of Engineers. Dr. Newell also addressed a gathering of San Francisco engineers on August 27th at the rooms of the Commercial Club. The title of his talk was "The Engineer in Modern Life: His Needs and Ideals."

CONVENTION POSTPONED

The Convention of the Northwest Electric Light and Power Association which was to have been held at Seattle September 10th to 13th has been postponed until September 24th to 27th. On account of the arrival of the fleet it will be impossible to secure accommodations in Seattle during the week of September 10th. Details of the Convention are given on page 230.

California Electrical Cooperative Campaign

From the meeting of the California Electrical Cooperative Campaign, held at Del Monte on August 21st, come the following notations:

K. E. Van Kuran, chairman of the Commercial Committee of the Pacific Coast Section of the N. E. L. A., is investigating the results accomplished by the California Electrical Cooperative Campaign, and will prepare a report for the central stations.

A. W. Childs, of the Southern California Edison Company, estimates that the solicitor campaign among the contractor-dealers in the southern part of the state has resulted in a saving to the central stations of \$100,000. This Lee H. Newbert, chairman of the Advisory Committee, believes has been duplicated in northern California. These figures sounded startling, but still so convincing that A. Emory Wishon, president of the Pacific Coast Section of the N. E. L. A., suggested to Mr. Van Kuran that his committee might do well to investigate and report thereon.

The improvement of the contractor-dealer is also becoming evident in the large number of sales of electrical appliances. The Advisory Committee believes that an investigation of these will result in some startling figures. For that reason Chairman Lee H. Newbert has instructed a special committee composed of D. E. Harris, Robt. Sibley and Nathan A. Bowers to gather statistics on the volume of business done in California from the manufacturers and jobbers, for the information of the Campaign's many contributors.

At the present time the Advisory Committee is considering plans by which bonuses will be given by the contractors and dealers to their sales people for the obtaining of new business. It is the sense of the members of the Advisory Committee that the efficiency of any business can be materially increased if its sales people know that their prosperity is linked closely with the firm's prosperity, and that they are in a material way partners with the owner in making the business a success.

National Electric Supply Jobbers' Association

The quarterly meeting of the Pacific Division of the National Electric Supply Jobbers' Association was held at Del Monte during the past semi-monthly period, and though very small in attendance, proved to be one of the most helpful of these gatherings.

A sensible discussion took place along the lines of trying to forecast the possible rising or falling of cost of electrical apparatus or supplies for the coming six months period, and the discussion brought out the fact that in all probability the cost would remain the same or possibly be a little higher than in former months.

Business from all over the country, as reported by manufacturers' letters, appears to be very active and the outlook for the electrical industry is unusually promising for the months ahead.

Those in attendance at the gathering were as follows:

Nathan A. Bowers, Pacific Coast Editor McGraw-Hill Company, San Francisco
 T. E. Bibbins, president Pacific States Electric Company, San Francisco
 H. L. Harper, Los Angeles manager Western Electric Co., Los Angeles
 C. B. Hawley, Intermountain Electric Company, Salt Lake City
 Albert Elliot, secretary Pacific Division National Electric Supply Jobbers' Association

G. E. Arbogast, president Southern California Association of Electrical Contractors and Dealers, Los Angeles
 H. D. Randall, president Capital Electric Company and local manager, General Electric Company, Salt Lake City
 M. A. De Lew, president California Association of Electrical Contractors and Dealers, San Francisco
 R. M. Alvord, local supply manager General Electric Co., San Francisco
 A. W. Childs, superintendent of sales, Southern California Edison Company, Los Angeles
 C. B. Hall, manager Illinois Electric Company, Los Angeles
 K. E. Van Kuran, Los Angeles district manager of Westinghouse Electric & Manufacturing Company, Los Angeles
 Robert Sibley, editor Journal of Electricity, San Francisco
 A. E. Wishon, assistant general manager San Joaquin Light & Power Corporation, Fresno
 L. H. Newbert, manager commercial department, Pacific Gas & Electric Company, San Francisco
 D. E. Harris, sales manager Pacific States Electric Company, San Francisco
 Miles Steel, Pacific Coast manager Benjamin Electric Manufacturing Company, San Francisco
 H. E. Sanderson, Pacific Coast manager Bryant Electric Company, San Francisco
 Garnett Young, president Garnett Young Company, San Francisco
 C. C. Hillis, Pacific Coast manager Electric Appliance Co., San Francisco
 W. S. Berry, Pacific Coast sales manager Western Electric Company, San Francisco
 Howard Angus, secretary California Electrical Cooperative Campaign
 C. H. Talmage, Salt Lake district manager, Western Electric Company, Salt Lake City
 F. J. Zorn, Seattle manager Pacific States Electric Company, Seattle
 M. L. Scobey, manager Home Electrical, San Francisco
 Frank Airey, Los Angeles manager Pacific States Electric Company, Los Angeles
 W. G. Wurfel, Pacific Coast manager Westinghouse Lamp Company, San Francisco
 Jim Pomeroy, manufacturer's agent, Los Angeles
 J. M. Kemp, attorney-at-law, Los Angeles
 C. E. Listenwaller, Listenwaller & Gough, Los Angeles
 W. R. Dunbar, Electric Ry. Mfrs. & Supply Co., Los Angeles
 F. H. Murray, National Carbon Company, Los Angeles
 H. L. Bargion, Fobes Supply Co., Seattle
 C. E. Heise, San Francisco district manager Westinghouse Electric & Manufacturing Company, San Francisco
 Geo. A. Boring, Portland manager Pacific States Electric Co., Portland
 W. B. Sawyer, U. S. Steel Corporation, San Francisco
 Walter Seaver, in charge wire division, U. S. Steel Products Co., San Francisco
 C. Z. Yost, Electrical Engineer, San Francisco
 Earl Alexander, Alexander & Lavenson Co., San Francisco

The golf cups as always were keenly contested. The famous Jobbers cup went to Earl Alexander of the Alexander & Lavenson Company of San Francisco, the baby member of the Jobbers' Association. Mr. Alexander also carried off the Pass & Seymour cup and the Hotel del Monte cup. R. M. Alvord, local supply manager of the General Electric Company in San Francisco, was the winner of the Manufacturers' cup, while the Turner Trophy cup was won by Willis Dunbar of the Westinghouse Electric & Manufacturing Company.

Northwest Electric Light and Power Association

(Since this program was outlined the date of the convention has been changed as elsewhere announced. The dates of the various events as recorded here will of course be changed to correspond.—The Editor.)

The annual convention of the Northwest Electric Light and Power Association will be held in Seattle, September 10th to 13th, 1919. The business meetings will be held at the Press Club Hall, 1311 Fifth Avenue. A most interesting program has been prepared and a large attendance is expected.

On Wednesday, September 10th, the morning session will be devoted to routine affairs. At the afternoon session the Technical Committee Report, by G. E. Quinan, chairman, and a paper on Accounting, by J. S. Simpson, will be presented. There will be ample time given for discussion on both papers.

At 8 o'clock in the evening an illustrated lecture by Dr. W. H. Eastman will be given to the members and delegates present and invited guests. This will be an intensely interesting chronicle of electrical events during the war period, and we are assured that information will be presented that is unknown to the majority of the men in the electrical industry. Things brought out by stress of war will be dwelt upon, together with a large number of most interesting investigations along electrical lines.

Thursday morning a paper on the Value of Public Utility War Experiences and their Effect on the Future, by W. H. McGrath, will be presented, and in the afternoon a paper on Industrial Electric Heating, by C. A. Winder, will be given.

Friday will be devoted to round table conferences. In the morning one on Improving Electrical Merchandising will be led by W. R. Putnam and L. A. Lewis, and in the afternoon one on Ranges and Water Heaters, led by A. C. McMicken.

It is hoped that these conferences will bring forth much discussion and it is anticipated that a great deal of interest will be evidenced in these two very important subjects.

Election of officers will take place Friday afternoon, followed in the evening by the annual banquet, at which time a paper on "Reminiscences" by W. J. Grambs, who has been in the electrical industry since its beginning on the coast, will be presented.

Much entertainment has been provided for in the way of theater parties, trips to Snoqualmie Falls, luncheons, and on Saturday morning a golf contest for a cup which is to be played for annually, and other interesting features which should afford plenty of diversion during the convention.

H. J. Gille is president, and W. E. Herring, Electric Building, Seattle, is secretary of the Association.

N. E. L. A. Committee Appointments

The following announcements are made by President R. H. Ballard relative to committees of the National Electric Light Association:

S. M. Kennedy, general agent of the Southern California Edison Company, has accepted the chairmanship of the Committee on Service to present the subject to the Pacific Coast Convention next year. Mr. Kennedy is the author of several papers along this line delivered and published in the past, including "The Man in the Street" and "Courtesy as an Asset." John F. Gilchrist, vice-president of the Commonwealth Edison Company, Chicago, Ill., has accepted the chairmanship of the Committee on Public Information, which is a new General Committee.

The work will be organized by establishing in each state or geographic section a local committee which will finance itself, and will furnish new bulletins to the press. Recommendations for appointment as members of the general committee of men selected as chairmen of committees in the various states will be made by Mr. Gilchrist to the president for his approval and for action by the Executive Committee.

The committee will be very large, but as it is unlikely that as an entirety it will ever be called upon to meet together, this will not be objectionable.

Mr. Gilchrist was instrumental in starting a movement along these lines in the state of Illinois which has proven very successful, and the thought is to extend this to all states in the Union so far as company members in the several states desire such assistance.

Franklin T. Griffith, president, Portland Railway Light & Power Company, Portland, Oregon, has accepted the chairmanship of the Committee on Water Power Development. This committee is being organized to investigate and encourage water power development, and is the first general committee on this subject which the Association has had.

Mr. Griffith will associate with himself prominent executives from all Pacific Coast companies interested in the subject and some executives from eastern companies.

Lee H. Newbert, Pacific Gas & Electric Company, San Francisco, has accepted the chairmanship of a Committee on Cooperation in the Industry, to prepare a report on this subject. This committee will present the subject at the Pacific Coast convention from the standpoints of central stations, manufacturers, jobbers and contractor-dealers, showing how they can work together for the general good of the industry, what should be done from day to day along these lines in the ordinary course of the day's work, and the important place that each branch of the industry occupies.

Mr. Newbert will use for his guide the experience of the California Electrical Cooperative Campaign which was developed in the Pacific Coast Section, and of which Mr. Newbert has been chairman for several years. This committee will include representatives from all branches of the industry.

Illuminating Engineering Society

A tentative list of subjects to be covered at the 1919 convention of the Illuminating Engineering Society at Chicago, October 21 to 24, has been announced by the papers committee. The committee on programs will review lighting developments during the war including, if possible, some of the new things which heretofore have not been openly discussed. Searchlights, their development and application during the war, will be another interesting feature.

A paper on "Viaduct Lighting" will describe an installation made without poles and involving an unusual and interesting method of distributing light over the roadway with provisions for reducing glare. Recent developments in equipment and applications of electric street lighting will also be discussed.

For the industrial man there will be a paper entitled "Industrial Lighting" which will give data and descriptions of good installations recently put in under the advice of experts of important central stations.

State experts will give their experience in applying and enforcing industrial lighting; the importance of insuring industrial safety by means of wide regulations will center much interest on this topic; a message from the merchandiser to the illuminating engineer will be included in a paper entitled "Illuminating Engineering and Merchandising."

A. I. E. E. Committee on Development Report

(The A. I. E. E. Committee on Development was appointed in October, 1918, to consider modifications in the field and methods of work of the Institute. The following is extracted from the Committee's report presented on August 12th of the present year, and embodying the results of discussion during the recent convention at Lake Placid.—The Editor.)

There is an almost unanimous view that the Proceedings published by the A. I. E. E. do not seem sufficiently to interest the membership at large, and the suggestions of a remedy cover a wide range of possibilities. The value of the class of papers which heretofore have been published in the Proceedings as representing advances in the art and constituting a record of progress is appreciated and it is insisted that the high standard of the Institute should be maintained, but it is believed that this view is not inconsistent with a recognition of the rights of 90%, or perhaps 95%, of the total membership who are concerned with the day-to-day engineering problems and with the personal side of engineering relationships. It is believed that if the Proceedings can be properly expanded that publication will serve better both to bind the present membership closer together and furnish an added incentive for engineers not already members to join. The Development Committee feels that further study should be given to this matter in order that the very best plan may be adopted.

Publication —

It was recommended that the Publication Committee be asked to consider improvements in the present plan of publishing the Proceedings and the Transactions and of printing and distributing copies of Institute, Section and Branch papers.

That in dealing with these questions the Publication Committee consider:

a. Enlarging the editorial and executive publication staff for the purpose of expanding the Proceedings to contain additional live matter of interest and value to the membership as a whole without giving less importance to the principal activities of the Institute, i. e., the promotion of the fundamental advance in the art and the encouragement of original investigation in the field of electricity.

b. Publishing all Institute papers and occasional papers of unusual broad general interest and value from Sections or from other sources; publishing a set of abstracts of every paper presented to every Section so that each month there will be a complete record of this class of Institute activity.

c. Eliminating as far as may be feasible the duplication of expense now incurred by twice publishing the papers heretofore distributed (in both the Proceedings and the Transactions) but without depriving the membership of the Transactions in some form.

d. Publishing discussions in the Proceedings.

e. Endeavoring to increase the revenue producing capacity of the Proceedings by expanding its advertising policy and if necessary changing its page dimensions.

f. Printing pamphlet copies of some or all Section and perhaps Branch papers and economizing on the cost of printing Institute and such Section and Branch papers by limiting their quantity and free distribution while making them available for the membership.

Organizations and Activities —

Another unanimous desire of the membership is for closer contact between the Institute officers, prominent engineers and the Sections as a means of improving the

morale of the organization, stimulating Section activities and of interesting the membership at large, particularly the younger members in Institute work. With the large number of Sections and Branches now in existence and the probability that this number will increase, it seems obvious that if the present Institute officers were to comply with this demand they would have time for nothing else and even then the demand would not be satisfied. An obvious alternative therefore is to have more officers and let them be chosen from different parts of the country. If this be done and these officers are to be really participants in the Institute management and not simply visiting functionaries, means must be provided to insure their attendance at Institute and Board meetings. It is believed that these objects can be accomplished by decreasing the number of Institute meetings, thereby reducing the demand of the time of its officers by holding them in different parts of the country, thus making it easier for those residing at points remote from headquarters to attend and by paying the expenses of Board members when in attendance. If the Institute meetings be not held in New York it almost naturally follows that the New York members; constituting a very large and important per cent, should organize a Section so that their present opportunities may be expanded instead of abridged.

In order to accomplish the results described, the Committee makes the following recommendations:

(a) That a New York Section be organized and conducted on the same lines as existing Sections elsewhere.

(b) That the present practice of holding some of the Institute and Directors' meetings in different localities, where local Sections are established, be extended, instead of holding nearly all of these meetings in New York as at present. It may be desirable to reduce the frequency of Institute and Directors' meetings and to hold them every two months or perhaps even less frequently, instead of every month as now.

(c) That the country be divided into geographical divisions corresponding in number to the number of Institute vice-presidents. If more than six divisions should be thought desirable, they should be established and the number of vice-presidents increased to correspond. In order to allow for the future shifting of membership density and at the same time to escape the necessity of cumbersome constitutional amendments the number and delimitation of geographical divisions should be specified in the by-laws instead of the constitution, to provide for ready amendment by the Board of Directors.

(d) That one vice-president be selected from each geographical division, the president and managers to be elected from the membership at large as at present.

(e) That the Institute should pay the traveling and living expenses of the officers and Board members when attending Institute meetings.

(f) That it be the duty of each vice-president to visit each Section in his own division at least once a year, the Institute to pay his traveling and living expenses for such visits. Of course it would be desirable if the vice-presidents could exchange visits.

(g) That the vice-presidents' term of office be lengthened from one year to two years and the constitutional inhibition against the

A. I. E. E. DEVELOPMENT COMMITTEE ACTIVITIES

By J. C. Clark

Retiring Chairman of San Francisco Section, A. I. E. E.

For some years there have been clear indications that a considerable number of members of the American Institute of Electrical Engineers earnestly desire changes in the functioning of the Institute—particularly in the Proceedings. It was in response to such desire that last winter Past-President Adams appointed a "Development Committee" headed by Mr. Calvert Townley. In general, this committee functioned admirably and succeeded in gathering from the membership and submitting to the Executive Committee of the Development Committee a number of very interesting and valuable suggestions. Chairman Townley ably digested these suggestions, and presented them at the sessions of the Development Committee during the recent Annual Convention of the Institute at Lake Placid Club, New York, which the writer attended as Development Committeeman for the San Francisco Section and Delegate of that Section. For a report of these sessions, see Proc. A. I. E. E., July, 1919, pp. 253-255.

There is certainly very urgent need of an improvement in the selection of papers printed in the Proceedings. While it is to be conceded that every worthy electrical engineer ought to join the Institute as a matter of loyal support to that body, and in order to identify himself with the national organization of his profession, yet he has a perfect right to expect that the Proceedings shall contain articles of general interest to the majority of electrical engineers. In recent months, there have appeared in the Proceedings a number of papers which have had little or nothing to do with electrical engineering. As an example of such papers, consider the one in the July Proceedings entitled "The Absolute Measurement of Sound." Just why this entertaining account of pure physical research appears in the Proceedings of the Electrical Engineers instead of, say, the Physical Review, is a profound mystery. Does our Institute's Meetings and Papers Committee operate with any clearly understood policy regarding its selection of papers? It appears not.

Certain prominent members of the Institute have objected strenuously and with justice to any "lowering of the high standards of the Institute." Such lowering would indeed be a calamity, but the writer believes that the inclusion of real engineering matters, together with the advanced technical papers in the Institute Proceedings could not possibly be construed as a lowering of standard. On the other hand, there should be no trespassing by the Proceedings upon the recognized field of our technical press either in popular descriptive articles, current news, or advertising. In these ways, our technical journals perform invaluable service for the profession, and the industry, and their position should not be weakened by any uncalled-for competition on the part of the Institute.

election of a vice-president as manager be removed. Provide against too extended tenure of office by a constitutional provision that, except in the case of a manager or a vice-president, who may be elected president, no member may continuously hold office longer than six years.

In the matter of Activities the following recommendations are made:

(a) That committee work be decentralized as far as it may be found feasible and desirable by substituting Section committees for Institute committees. Establish a general committee to study this question and make recommendations.

(b) That more high grade papers of general engineering interest be presented.

(c) That a committee be created in each Section charged with the duty of assigning to the younger members specific participation in designated meetings by the preparation of papers, discussion or otherwise. It is hoped by this means and by the appointment of a reasonable number of the younger men to the larger committee membership caused by decentralization, that the interest of the younger men will be stimulated, and their loyalty increased.

Local Federation and National Council —

There is a universal recognition of the fact that engineers do not participate as actively or as prominently in public affairs as they should and that both the public welfare and their own individual advancement would be promoted if this condition could be rectified. There are two general reasons believed to be responsible for the existing condition, one a lack of any general organization of engineers which would facilitate their cooperation, and second, too great technical specialization in the engineering curricula of our technical engineering student and start him on his career with an exaggerated idea of the importance of specialization and an insufficient appreciation of the part he must play in public affairs.

It was felt that the Institute could properly take a constructive step by adopting a skeleton plan for cooperation and then appoint conferees who could discuss the matter with similar conferees from other societies, and endeavor to agree to definite recommendations to their respective governing bodies. With this object in mind the Committee recommends:

(a) That a comprehensive but flexible uniform outline for the federation of local engineering bodies be prepared, taking advantage of the experience already gained by existing affiliations.

(b) That we use our endeavors to have the other national societies establish and support local Sections along lines similar to ours but do not confine local federations to such branches, rather planning to include all the worthy engineering bodies.

(c) That wherever such federations can be organized there be established under an appropriate name a federated local council of engineers to be made up of a properly apportioned number of representatives from the different locals.

In order to link up the local federations the Committee recommends:

(a) That there be established a direct touch between each local federated council and a National Engineering Council composed of delegates from as many National engineering societies as are willing and worthy to participate.

(b) That through the medium of the National and the local federated councils there be perfected a working arrangement for engineering cooperation in all public affairs where such is desirable.

Engineering Congress —

It is also recommended that there be inaugurated the custom of periodically holding an Engineering Congress, the delegates to which should be selected from all parts of the country under a plan to be developed for suitable representation, this Congress to consider and take action on such matters of general interest to engineers and to the public as may merit its attention and as have been previously advertised, for a sufficient length of time, to permit locals everywhere to give them consideration and when possible to send instructed delegates.

Education of Engineers —

It was the unanimous view of the members attending the sessions at Lake Placid that the matter of a possible modification of the engineering curricula in the technical schools and colleges should receive early and thorough consideration by the Institute. Following is an extract from the resolution which was there presented and adopted:

"This Committee would welcome the establishment at the earliest date practicable of a normal six years' collegiate course in engineering, two years of which at the least would be devoted to training in the humane arts and sciences including, for example, Political Science, Economics, History and General Letters; the last four years being devoted to sound training in the sciences and in only the fundamentals of diversified engineering.

With or prior to such a development we would endorse a program for the marked extension of vocational training in the industrial centers in order that the needs of industry may be met.

To the accomplishment of these ends this Committee requests the appointment of representatives to serve on a Joint Committee of Engineering Organizations to promote such a national educational program as shall provide for the future necessities of the engineering profession consistent with the needs of society."

While the Board did not specifically instruct the Development Committee to confer with similar Committees from the other National Engineering Societies, the Chairman was informally advised by the President that where such conferences could expedite and help to crystallize the viewpoint of the several organizations concerned without committing the Institute to any line of action they would be desirable.

HAPPENINGS IN THE INDUSTRY

REMODELING PLANT

The St. Joseph Railway, Light and Power Company of St. Joseph, Mo., are installing a new turbine in their steam plant. The turbine is of 12,500-kva. capacity, and is supported by a concrete foundation which extends down 70 feet to bedrock. The entire plant is being remodeled and equipped for oil burning. Hammel burners will be installed. One-half of the plant was formerly oil burning but was changed to coal in 1918, due to the shortage of oil. An oil bay of 120,000 bbl. capacity is under construction between the plant and the Missouri river. The steam capacity of the plant will be increased by the installation of two 1000-hp. Bigelow Hornsby boilers, and two new smoke stacks of 16 ft. and 12 ft. in diameter, each 260 ft. high.

THE PETROLEUM SITUATION

There is at the present time a world-wide interest in the oil situation. This has been induced as a result of the war calling attention very strongly to the need of petroleum and its products, both in a military and commercial sense. These products are, principally: gasoline for automobiles, farm trac-

tors, trucks, aeroplanes, motor boats, etc.; fuel oil for marine propulsion, metallurgical processes, and internal combustion engines of the Diesel type; and lubricants for all machinery.

During 1918 some thirty-eight million barrels of oil were imported from Mexico. Imports have been greatly increased during the first half of 1919 and they can be still further extended, according to the need of the United States, as it is chiefly a matter of demand and transportation. A great deal of interest is being displayed in establishing refineries on the Gulf Coast of the Atlantic seaboard to handle Mexican oil, the intention being to export Mexican oil and take off the gasoline and other desirable products, selling the residuum for fuel oil. A number of refineries for this purpose are being established.

At the present time the principal domestic source is in the Mid-Continent field which extends from Kansas through Oklahoma into northern Texas and Louisiana. This district is producing more than a half-million barrels of oil daily—more than half the total production of the United States. This oil averages above the rest of the country in quality and the proportion of gasoline obtained from this district is be-

tween 60% and 70% of that obtained from the total production of the United States.

Prospecting is going on extensively in Arizona, New Mexico, Utah, Montana and other states. In California, considerable new territory of great promise has been recently developed in the southern part of the state and in the Elk Hills district in Kern county.

The daily average production of gasoline during the month of May was, in 1917, 7,703,749 gallons; in 1918, 10,302,942 gallons; in 1919, 11,434,593 gallons. Gas and fuel oil stocks have increased from 515,000,000 to 789,000,000 gallons.

Active steps are being taken to establish a wider market for fuel oil, and it is at the present time competing very actively with coal for steam generation along the Atlantic seaboard, particularly in New England. It is anticipated that the completion of the refineries for handling Mexican oil on the Atlantic seaports will induce still stronger competition with coal in our seaports.

NEW FOREIGN CABLE

The National Foreign Trade Council has embarked upon a determined effort to secure substantial improvement of American facilities for cable and wireless communication across the Pacific Ocean. The council has appointed a special committee on foreign communications, which is taking up the subject energetically, with a view to securing prompt and effective action.

The final declaration of the Sixth National Foreign Trade Convention called for the establishment of American systems of cable and wireless as a national trade policy and pointed out that world trade can be handled only with facilities for telegraphic communication to all foreign countries.

The convention recommended that this national trade policy should be carried into effect first in those places where present service has proved inadequate, as in the case of the single cable that forms the only direct communication between the United States and the Orient.

NEW TRANSMISSION LINE

The public Service Company, Aurora, Nebraska, is building a 33,000-volt transmission line from Aurora to a point six miles west, thence northwest seven miles to Phillips. A branch line at 6600 volts will also be run to Giltner. No. 2 aluminum conductor is being used. To supply power to this new line the Central Power Company is constructing a 33,000-volt line from Grand Island to Phillips.

POWDERED COAL IN NEW MILL

Powdered coal is to be used throughout for firing boilers and furnaces in the new sheet mill of the Falcon Steel Company now being erected at Niles, Ohio.

The power plant boilers will be powdered-coal fired, using the Quigley Compressed Air System for transporting and burning the coal. The pulverized coal will be transported from the milling plant through standard four-inch diameter wrought pipes to furnaces and boilers for various distances aggregating approximately eight hundred feet, and will be switched from the main distribution line to a storage bin in the power house for use as required for the boilers. The contract for the complete equipment for preparing, distributing and burning the fuel has been awarded the Quigley Furnace Specialties Company, of New York.

GREAT WESTERN POWER COMPANY'S ISSUE OF STOCK

The Great Western Power Company of California is constructing a new hydroelectric generating plant of an initial capacity of 53,000 horsepower which will increase the installed hydroelectric generating capacity of the company to 140,000 horsepower, and a new 165,000-volt steel tower transmission line from this plant to Valona, the distributing center for the

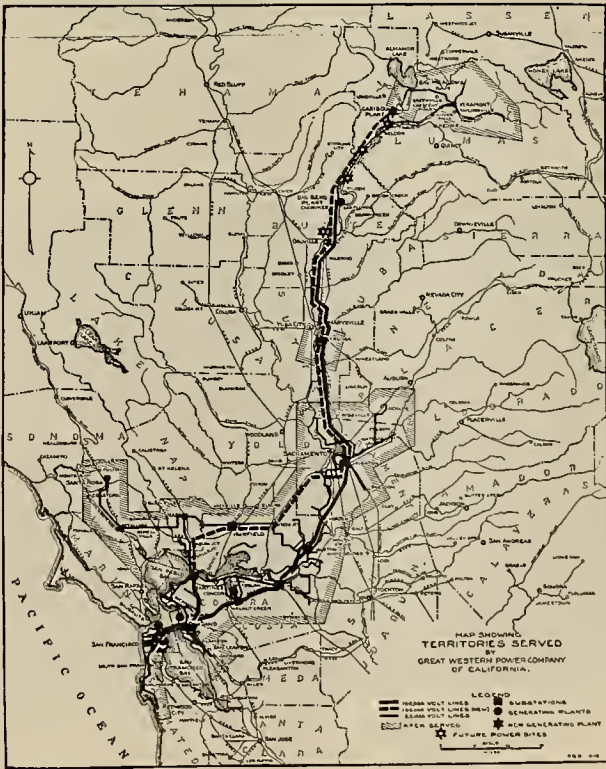
San Francisco bay district. This construction program of the company is to be financed from the proceeds of the \$1,500,000 preferred stock and \$6,000,000 in bonds, which have been authorized by the Railroad Commission of California. It is estimated that the transmission line will be completed early in 1920 and the new hydroelectric plant early in 1922. This increase in the generating and transmission capacity of the company is urgently required by the increasing demand for electricity in the territory now served by the distributing system of the company.

The development of California has been and will in the future be largely predicated upon hydroelectric power. Industry, agriculture, transportation, and indirectly, through the release of fuel oil, trans-pacific and Central and South American commerce, no less than the general demands of public service, are dependent upon the the water powers of the state.

A recent report on the central California power market by a representative of the Power Division of the War Industries Board discloses a present excess of over 30,000 horsepower of demand over supply, and a normal increase in demand of over 25,000 horsepower a year.

In the past six years the connected load of the Great Western Power Company has increased from 135,000 horsepower to about 280,000 horsepower and the number of customers served from about 12,000 to 27,000.

The present hydroelectric plant of the company at Big Bend, about 50 miles down-stream from Lake Almanor, with an installed capacity of 87,000 horsepower using the water at a head of 420 feet, has been in successful operation since 1909. The company is now constructing a second plant, to be known as the Caribou plant, at a point about 10 miles from Lake Almanor, which will use the waters at a head of 1,075 feet. This plant will have an initial installed capacity of 53,000 horsepower. The initial hydraulic development will permit increasing the capacity to 80,000 horsepower and duplicate tunneling will eventually raise the capacity to its ultimate maximum of 160,000 horsepower at an estimated cost of about \$60 per horsepower.



Map showing the territories served by the Great Western Power Company of California, the voltage of the various lines, and the substations and generating plants of the system. The announcement of a new issue of stock has directed special attention to this company's activities.

THE ELECTRICAL UTILIZATION SAFETY ORDERS

There has been some doubt in the minds of those who install electrical equipment as to whether the Electrical Utilization Safety Orders are simply advisory in character, or whether their purpose is to set reasonable standards for safety and make compliance with such standards obligatory. Furthermore, it does not appear entirely plain to many that these Orders, instead of being drafted by the California Industrial Accident Commission or its staff, were drafted by a committee appointed by the industrial, technical and labor organizations.

Attention is directed to the following sections of the Workmen's Compensation, Insurance and Safety Act of the State of California:

"Sec. 38. The commission is vested with full power and jurisdiction over, and shall have such supervision of, every employment and place of employment in this state as may be necessary adequately to enforce and administer all laws and all lawful orders requiring such employment and place of employment to be safe, and requiring the protection of the life and safety of every employe in such employment or place of employment.

"Sec. 39. The commission shall have power, after a hearing had upon its own motion or upon complaint, by general or special orders, rules or regulations, or otherwise:

(1) To declare and prescribe what safety devices, safeguards or other means or methods of protection are well adapted to render the employes of every employment and place of employment safe as required by law or lawful order.

(2) To fix such reasonable standards and to prescribe, modify and enforce such reasonable orders for the adoption, installation, use, maintenance and operation of safety devices, safeguards and other means or methods of protection, to be as nearly uniform as possible, as may be necessary to carry out all laws and lawful orders relative to the protection of the life and safety of employes in employments and places of employment.

(3) To fix and order such reasonable standards for the construction, repair and maintenance of places of employment as shall render them safe.

(4) To require the performance of any other act which the protection of the life and safety of employes and places of employment may reasonably demand."

NEW PLANT

The Beatrice Power Company is constructing a new plant on the Blue river at Barnston, Neb. A dam across the river will give a head of 18 feet which will be utilized through vertical turbine type water wheels directly connected to the generators. Two units of 425-kva. each will be installed. The dam will be of reinforced concrete, having a 250-ft. concrete spillway. The four tender gates 13 by 24 ft. will be operated by electric hoists.

A new 33,000-volt line, 23 miles in length, will be built from Barnston to Beatrice via Holmesville, replacing the present line from Holmesville to Beatrice.

AWARDS TO EMPLOYEES

The Holtzer-Cabot Electric Company of Roxbury, Mass., presented \$100 to every man and woman who had been in the employ of the company for ten years or more. Over 700 are employed in the electrical plant and more than 25% were the recipients of this welcome bonus. The company has a very enviable record in regard to its men. Where other manufacturers are bemoaning the high cost of employing new help and the losses in labor turn-over, the Holtzer-Cabot Company is fortunate enough to have one of the smallest labor turn-overs in New England. The Factory Management Committee works along modern lines with the several shop committees and this works out to the mutual advantage of the management as well as the employees.

ELECTRICAL COMPANY'S NEW BUILDING

A unique structure which bids fair to be a landmark is the new building of the Toledo Railways & Light Company in Toledo, with its gorgeous lighting scheme. The exterior decorative effect is Japanese wistaria vine in three shades of purple lavender, moss and canary greens, adorned with colored butterflies and huge peacocks. There will be 15,000 10-watt lamps in the outlining alone, and the entire cornice from the fifth floor up will be flood-lighted by a battery of search-lights, which will make it visible from every part of the city.

The decorations on the street floor, where there will be a large electrical display, will be all in orange. Over the main entrance will be two large electric signs fitted with letter slides to announce sales.

INSURANCE OF EMPLOYEES

A large group contract went into effect on July 31 when all the employes of the National Lamp Works of the General Electric Company came under the protection of the Travelers Insurance Company. These employes occupy several plants and are estimated at 11,000 in number.

As the amount per capita is between \$500 and \$1,000 nearly \$10,000,000 life insurance is involved. Each employe who has been with the company for three months is to receive \$500 life insurance. Those who have been with the company one year will receive \$600 and from that time on one hundred dollars will be added each year until the amount reaches \$1,000.

TRADE NOTES

High Tension Insulators —

The Westinghouse Electric & Manufacturing Company are going very extensively into the manufacture of insulators for high tension service. A separate plant has been established and a corps of engineers highly skilled in this class of work employed. A very high grade of insulator for high tension work is being produced in large quantities by this company.

A large order for high tension insulators was recently given the Westinghouse Electric & Manufacturing Company by the Southern California Edison Company for their long-distance 150,000-volt transmission system.

Electric Furnace Order —

The Electric Furnace Construction Company, Finance Building, Philadelphia, report an order received from a new steel casings plant—the Dodge Steel Company, Philadelphia. The installation will be a 3-ton furnace of the latest "Greaves-Etchells" type.

Contract for Transformers —

The contract for all distribution transformers used by the city of Los Angeles during the next year has been awarded to the Moloney Electric Company of St. Louis through their Pacific Coast representatives, the Garland-Affolter Engineering Company. This adds another system to the list of Moloney transformer users on the Pacific Coast. Garland-Affolter also report good business in Moloney transformers from many lighting and power companies throughout the West.

New Office Opened —

The Acme Wire Company of New Haven, Conn., announce that due to the increasing volume of their business in the middle west and the desirability of keeping in closer and more frequent touch with the requirements of their customers, they have opened an office in Cleveland, Ohio.

Their sales representative is Mr. J. T. Crippen, the office address is No. 521 Guardian Building, and the telephone number is Main 2024.

The step taken by the Acme Company will undoubtedly result in a closer and more effective association with their many friends in the middle west.

New Company —

The Standard Transformer Company of Warren, Ohio, has been incorporated under the state laws of Ohio for the purpose of manufacturing a complete line of bell ringing transformers. They have consummated an agreement with the Packard Electric Company of Warren, whereby they will in the future manufacture the bell transformers placed on the market by the Packard Company about six years ago.

Water Wheel Contract —

Wellman-Seaver-Morgan Company of Cleveland, Ohio, have been awarded the contract for two 28,000-hp. Francis type water wheels to be installed in the San Francisco No. 2 plant of the Los Angeles Aqueduct system. These wheels will operate under a head of 530 feet.

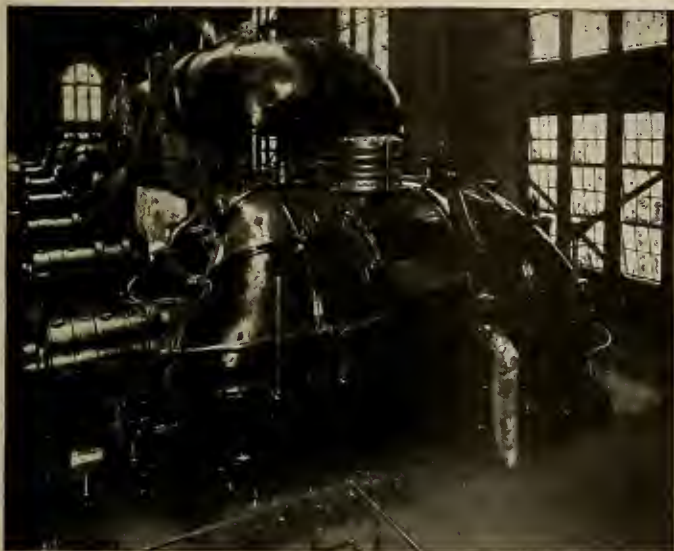
LATEST IN EVERYTHING ELECTRICAL

(An automatic ore unloader which reduces labor and supervision to a minimum, and which is already being successfully operated on a large scale, is among the electrical devices of interest described here. Other items are a large new turbine with special features, and a new line of bell ringing transformers.—The Editor.)

A NEW TURBINE INSTALLATION

The Interborough Rapid Transit Company, New York, has recently placed in operation at its 74th Street Power House, a Westinghouse turbine that is remarkable for two reasons.

It is, in the first place, rated at 60,000-kw. capacity continuously, and 70,000-kw. for two hours; so it is, therefore, the most powerful prime mover in the world.



Close-up view of Westinghouse 70,000-kw. triple compound turbine, the largest in the world. The total steam consumption at full load is 826,000 lbs. per hour.

Secondly, it has three elements, one high-pressure and two low pressure, and it is the first triple cross-compound turbine to be placed in operation.

The new unit occupies a floor space of 52 by 50 feet and is about 19 feet high. The big pressure element receives steam at 205 lbs. gauge pressure, and superheated 150° F., and it exhausts into the low pressure elements at 15 lbs. gauge pressure. The two low pressure elements are identical in construction, and each receives one-half of the steam from the high pressure element and exhausts it into the condenser where a 29 in. vacuum is maintained. All three elements operate at 1500 r.p.m., and each drives a generator rated at 20,000-kw. continuously, 23,500-kw. for two hours, and 30,000-kw. for a half-hour. The generators deliver three-phase, 25-cycle, 11,000-volt alternating current.

Though consisting of three separate elements, the entire machine is started, synchronized, and controlled as a single unit. At the same time, any one or two of the elements can be shut down without interfering with the remainder. The three small elements are mechanically much stronger than a single large one would be; the temperature differences in any cylinder are considerably less, and commercially common materials, with moderate blade speeds and stresses, can be used.

All the turbines are of the pure reaction type, without the usual impulse elements, as this construction is considered preferable in view of the great volumes of steam to be handled. The governing mechanism must not only control the unit as a whole, but also each turbine operating separately. Each turbine also has an emergency stop, which will operate

automatically in case the governor fails and the turbine begins to race.

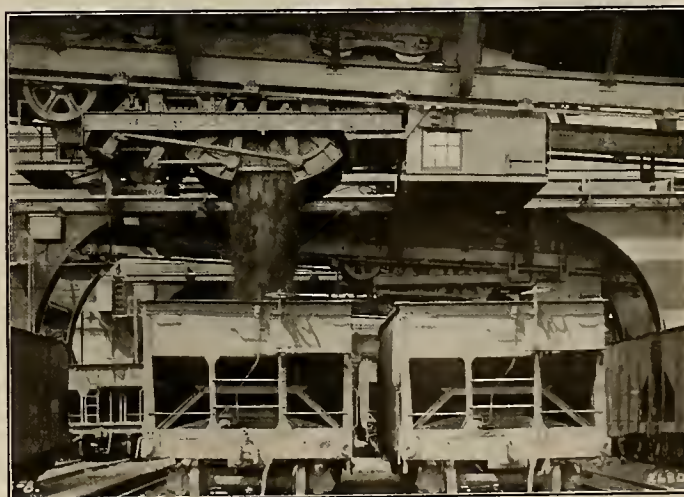
The steam consumption of the entire unit at its point of best efficiency is 10.7 lbs. per kw-hr.

AUTOMATIC ORE UNLOADER

An automatic unloader, manufactured by the Wellman-Seaver-Morgan Company of Cleveland, Ohio, has proved to be a most successful device for loading ore cargoes from lake steamers. Although it is of immense proportions, the design has been much simplified and the control perfected to such a point that the machine is very easily operated.

The unloader consists of a main framework mounted on trucks which travel along the runway rails. The main framework extends back to the rear runway over a temporary storage pile where the ore can be discharged if desired. Between the front and rear runways, space is provided for railroad tracks where ore-carrying cars are placed under the machines and loaded with ore for transportation to the furnace plants. The girders of the main framework form a support for runway rails, on which a trolley travels. This trolley supports a balanced walking beam, from the outer end of which a stiff bucket leg depends. At the lower end of this leg is the bucket, which is operated by machinery located on the walking beam. All horizontal movements of the bucket are accomplished by means of moving the trolley backwards and forward on the girders. The vertical movements of the bucket are accomplished by the operation of the walking beam. The forward portion of the beam being out of balance, the bucket descends by gravity as soon as the brakes of the hoisting mechanism are released.

The hoisting mechanism controlling this operation is located in the enclosed house at the rear end of the walking beam. Ropes from the winding drums of this mechanism pass around sheaves located in the rear end of the trolley and are anchored to the rear end of the walking beam.



Scale larry, into which the main hopper discharges the ore. This larry accurately weighs the ore and discharges it into cars or into storage.

In addition to the main parts of the machine which we have described, there is also a receiving hopper located at the forward end of the main framework and between the main



On the docks at Ashtabula are eight of these electrically operated unloaders. Each machine is equipped with a suitable mechanism for accurately weighing the ore.

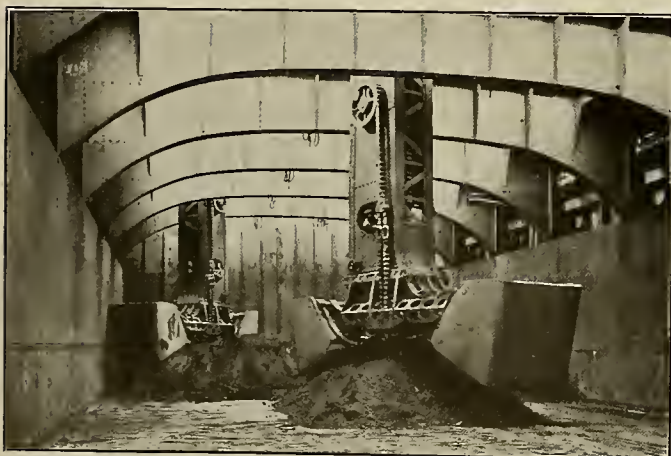
girders, provided for the purpose of receiving the ore discharged from the bucket. The capacity of this hopper is about three full bucket loads, and its purpose is to act as a balancing point for the ore between the bucket and the cars, or storage, as the case may be. The bottom of the hopper is provided with outlet gates and the contents are discharged as required into a larry which runs on an auxiliary track suspended from the under side of the main girders.

The larry, after receiving its load from the main hopper, moves to a point so that its contents can be discharged either into the cars standing on the railroad tracks beneath the main span of the girders or into a temporary storage pile at the rear of the machines.

Machines of this type have been made in two sizes, the smaller size having a capacity of ten tons and the larger size having a capacity of seventeen tons in the bucket shells. The machine shown here is electrically operated throughout, and its speeds are regulated so as to operate through a complete cycle in about 50 seconds.

Some idea of the capacities of unloading by this method may be derived from a record which was made by eight machines of this type having a capacity of fifteen tons each, unloading seven boats having a total capacity of 70,000 tons in 22 hours actual time.

Only two operators are required for the entire operation of one of these machines. One of the operators, whose station is in the bucket leg directly over the bucket shells, controls all of the motions of raising and lowering the bucket, of traveling the trolley back and forth, and moving the machine



Unloader leg and bucket at work in the hold of a boat. The leg is so mounted in the walking beam that it can rotate in a circle, allowing the bucket to reach out in all directions.

along the dock from one hatch to another. The second operator is stationed in a cab on the larry and from this station he controls the movement of the larry, the operation of the larry gates, and the weighing of the ore.

Records extending over considerable periods show an unloading cost ranging from $2\frac{1}{2}$ to $4\frac{1}{2}$ cents per ton, which includes superintendence, labor, repairs and materials on the machines, as well as the cost for power and light.

NEW BELL RINGERS

The complete new line of bell ringing transformers just placed on the market by the General Electric Company, Schenectady, New York, comprises nine standard ratings, divided into two general classifications. The household type is intended for the ordinary signal systems found in residences. The heavy duty types are for larger and more powerful signal systems in office buildings, hotels, apartment houses, mines, industrial plants, etc.

In the first class is the household size transformer, having ample capacity for all ordinary residential requirements, and built in three ratings, as follows:

For 110-volt, 50-140 cycle service
For 220-volt, 50-140 cycle service
For 110-volt, 25-49 cycle service

The heavy duty types are made in nominal rated capacities of 50 and 100 watts. Three secondary voltages are provided on these sizes, experience having shown this to be desirable on account of diversified requirements met with in this class of installations.

The transformer is designed for high electrical efficiency, core losses being exceptionally low. Careful attention has been paid to avoiding any hum. All current carrying parts are completely surrounded by steel, thus meeting Underwriters' requirements, so that no additional steel box for enclosing the transformer is required in installation.

The transformers are finished in green enamel, and packed in attractively labeled individual cartons. The parts for these transformers are also available for transformers for other purposes, such as toy transformers, special relay auto-transformers, etc.

A USEFUL CHART

A chart which gives the relations in any shaft between the power shaft diameter, torsional stress and speed, has been prepared by one of the engineers of the Wellman-Seaver-Morgan Company of Cleveland, Ohio. Given any three of the factors—power, speed, allowable torsional stress and shaft diameter—it is possible to determine the fourth from the chart. The company is willing to send copies of the bulletin containing the chart to all engineers and draftsmen without charge.

ELECTRIC CAR BREAKS RECORD

At the recent National Electric Light Association meeting at Atlantic City, a special record run was made in which a Raulang Electric was the central figure. An interesting paper was read on the Electric Car on the first day and at the suggestion of the New York Edison Company a Raulang Electric was driven against time from New York to Atlantic City to properly inaugurate the convention.

The run was made under the direction of Herbert Mould of the New York Edison Company and the car driven by D. P. Stagg. The previous record was five hours and fifty-seven minutes for the one hundred and nineteen miles. The Raulang made it in five hours and thirty-nine minutes elapsed time. The car was equipped with Exide batteries, forty-five cell, fifteen thin plate.

Books and Bulletins

The Insulator Book

The Locke Insulator Manufacturing Company of Victor, N. Y., has issued a very distinctive publication under the title of "The Insulator Book." It aims to give a concise statement of the art of electric power transmission, beginning with a general history and continuing with a discussion of insulating materials, insulator design, insulator testing, line protective devices, arrangement of conductors, and so forth.

The book is strongly bound and very fully illustrated with photographs and line drawings. It is printed on heavy glazed paper, with particularly clear type arrangement, and is very convenient to handle.

At the end are numerous tables, of distinctly practical value.

New House Organ

The initial number of a new house organ appeared very recently—The Youngstown Sheet & Tube Bulletin. Its purpose is to increase corporate feeling among the employes, and as far as possible the magazine will be their own work. In this first number all the material, including the art work, was contributed by the employes; the photographs were made by the company's own photographic department, and only the engraving and printing were done outside.

Bureau of Standards

Technologic Paper No. 124 issued by the Bureau of Standards is "Constitution and Microstructure of Silica Brick and Changes Involved through Repeated Burnings at High Temperature," by Herbert Insley and A. A. Klein. The investigation involves a petrographic microscopic study of test cubes and commercial silica brick, some of which had received repeated burnings by use in kilns.

The Bureau of Mines also issues a paper by W. C. Phalen on "The Present Situation in the Magnesite Industry."

Hydroelectric Report

The Hydroelectric Power Commission of the Province of Ontario has published its eleventh annual report covering activities for the year ending October 31, 1918. It contains a complete review of the hydroelectric systems of the province, the construction work carried on during the year, the financial position, legal proceedings and general activities of the Commission, together with a number of photographs, maps, charts and tables.

Batteries for Trucks and Tractors

Electrically propelled trucks or tractors, now found in manufacturing establishments throughout the country, are largely used in railway and wharf haulage and in mines. These applications are shown in an interesting booklet just issued by The Electric Storage Battery Company of Philadelphia, the manufacturer of the "Ironclad-Exide" Battery, whose batteries are extensively used in the industrial truck and mine locomotive. Copies of this book can be secured from any sales office of the company or by direct request to their general offices at Philadelphia.

Miscellaneous

Extracts from an address by Otto H. Kahn before the Carnegie Institute, Pittsburgh, have been published in pamphlet form under the title "Capital and Labor—A Fair Deal."

The Electric Storage Battery Company of Philadelphia, Pa., have ready for distribution a revised booklet describing the "Ironclad-Exide Battery."

The Safety Bulletin for July, 1919, has been published by the Bureau of Safety, Chicago.

Heavy Electrical Construction Materials

A well arranged and attractive catalog is issued by the General Devices and Fittings Company of Chicago, describing their heavy electrical construction materials. The catalog is designed to give the engineer the information necessary in making his layouts or detail drawings and for matching up of various units of equipment. This information is given in the form of individual sheets and printed on bond paper on one side only for the convenience of draftsmen or others frequently using the sheets. They are punched for binding in the catalog cover supplied, and an individual sheet can be readily removed for use.

Theater Dimmers

In order to reach theater electricians, contractors, architects and others interested in the control of lighting effects in legitimate and "movie" theaters, as well as lodge halls and churches, The Cutler-Hammer Manufacturing Company of Milwaukee has prepared a 28-page, 8½-in. by 11-in. booklet entitled "C-H Theater Dimmers." The booklet contains 33 illustrations of installations selected from a list of houses which cover the majority of the principal theatrical centers of the United States. These illustrations of theater dimmers and switchboards will serve well the theater electrician or contractor, because they show the latest practice in theater lighting control equipment. The details of a typical large equipment are given in the copy matter. Particular emphasis is given to the play of color and the shifting color harmonies secured through the use of this large dimmer bank. Details of construction and operation, typical methods of mounting and other interesting features are included in the descriptive matter.

Large Power Drives

The Morse Chain Company of Ithaca, N. Y., send out a neat catalog, their latest publication, showing Morse Chain Drives as applied to 100-hp. up to 5,000-hp. This is listed as Publication No. 14, and is a revised edition. It has an attractive cover in cinnamon and gold and a large number of interesting illustrations.

Household Appliances

The Simplex Electric Heating Company of 85 Sidney St., Cambridge, Mass., issue two cheerful display cards, one showing their domestic iron, the other their new No. 27 domestic range. These cards are being sent to their leading distributors.

The Railroad Problem

"The Railroad Problem: Comments on Certain Methods Suggested for Solving It" is the title of a paper by Robert S. Lovett, president of the Union Pacific System. The discussion is divided into two parts—the first an analysis of the weakness of certain proposed plans, the second the presentation of what the author considers a sound remedy. The latter embodies compulsory federal incorporation, exclusive federal regulation of railroad securities, exclusive federal regulation of freight and passenger rates and the creation of a government Department of Transportation.

Annual Reports

The fourth and fifth annual reports of the Public Utilities Commission of the state of Colorado are combined in a recently issued report covering the biennial period, December 1, 1917, to November 30, 1918. It includes a review of decisions, orders and rulings, of steam and electric railroads, a section on engineering and statistics on various utilities.

The Board of Public Utilities of the City of Los Angeles has issued its ninth annual report, covering transactions for the fiscal year beginning July 1, 1917 and ending June 30, 1918. It embraces reports and statistics on Electric, Gas, Telephone and Water Utilities, Railway Transportation, and Jitneys and Interurban Motor Buses.

NEW ELECTRICAL DEVELOPMENTS

(Various power and irrigation projects are reported from the Northwest as being under way, or contemplated. Satisfactory progress in the financing of the Hetch Hetchy undertaking is reported in the Pacific Central district, as well as numerous important irrigation items. In the Southwest irrigation plans are featured, while the Intermountain district shows great activity in new installations, transmission lines and city improvements.—The Editor.)

THE PACIFIC NORTHWEST

MORTON, WASH.—The Morton Electric Company's plant has been sold to J. P. Haggerty of Tacoma for \$10,000.

SPOKANE, WASH.—The Universal Electric Company will erect a building at 1218 Second street at a cost of \$10,000.

SEATTLE, WASH.—An estimate of \$1,520,335 for supplies for the light department has been approved by the city council.

SEATTLE, WASH.—The Acme Motor & Machine Company has been incorporated for \$15,000 by M. R. Farrell and others.

SEATTLE, WASH.—J. Bechler, Mayflower Dairy, 917 Virginia street, is to erect a brick power house at a cost of \$24,000.

HOQUIAM, WASH.—Plans and specifications have been completed by the Commercial Club for a curb lighting system on 8th and 9th streets.

TACOMA, WASH.—Tacoma has voted to acquire the Lake Cushman power site, the ultimate capacity of which is estimated at 75,000 horsepower.

COLFAX, WASH.—The Washington Water Power Company of Spokane is planning to spend about \$28,000 this fall in putting in a heavier line to the city.

VALE, ORE.—Barring any unforeseen accidents the big dam at Riverside should be completed by October 1, according to present observation of those in charge.

EUGENE, ORE.—The Public Service Commission of Oregon has granted to the Oregon Power Company authority to increase its gas rates in the cities of Eugene and Springfield, Ore.

MARSHFIELD, ORE.—The Mountain States Power Company has been granted permission by the Public Service Commission of Oregon to increase its rates in the cities of Marshfield and North Bend, Ore.

SEATTLE, WASH.—An ordinance has been passed by the city council authorizing the Board of Public Works to continue the work of investigation to determine the proper location for dams and reservoirs in the vicinity of Ruby, Gorge Creek and Diablo Canyon.

SEATTLE, WASH.—Revenue derived from the operation of the municipal street railway during 1918 will aggregate \$7,017,000, according to an estimate filed with the city council by Supt. Thomas F. Murphine. Budget estimates submitted to the council by Supt. Murphine call for a total expenditure during the year of \$7,002,250.

BEND, ORE.—Resale of the bonds of the Suttle Lake irrigation project which has been under the supervision of J. F. Slarkson, of the G. F. Standifer Construction Co. of Vancouver and Portland, is about complete, according to Harry J. Chenowith, of Grandview, secretary of the project, and as soon as this has been completed work will begin.

BEND, ORE.—T. H. Foley, manager of local interests of the Bend Water, Light & Power plant, announces that construction of a 1000-kw. steam plant to cost about \$100,000 will be started at once, doubling the capacity of the power house here, and to be completed by February 1, 1920. The plan for construction of the \$125,000 plant on Turnalo creek, work on which was to have started this summer, will be held over until the coming summer.

PORTLAND, ORE.—Application for an increase in rates which will enable the company to realize a return of seven per cent on its investment has been filed with the city auditor by the Portland Railway, Light & Power Com-

pany as a necessary formality to the hearing to be held soon before the Public Service Commission. The application gives the city ten days in which to prepare and file its answer as one of the affected parties. Whether the city will contest the proceedings is undecided.

PORTLAND, ORE.—Work on the channel to connect Columbia river slough with the Columbia river began recently. The channel is being dug by the city to furnish flow in the slough to make possible use of this waterway for sewer purposes. Deputy City Engineer John R. Hanson, who has been connected with the city engineer's office for 21 years, has been placed in charge of the project, according to City Commissioner Barbur. It will take about one year to complete the job and the cost will exceed \$310,000.

KLAMATH, ORE.—The Department of the Interior defends the permit granted to the Oregon-California Power Company to construct a dam at the head of Upper Klamath Lake against which there have been numerous protests. In a letter to Senator Chamberlain, John W. Hallowell, assistant to Secretary Lane, asserts that all interests are protected in the building of this dam. He says the reclamation service needs more water for irrigation and the power company needs more water for power, and that there is abundant water for both. By the terms of the grant the power company is to build the dam and then convey the works to the government in return for the privilege of securing the added power.

OLYMPIA, WASH.—Marvin Chase of the state reclamation board has procured a ruling from the attorney general that \$10,000 may be expended from the board's revolving fund for determining the feasibility of a dam at Five Mile rapids in Snake river, regardless of whether the federal government appropriates a like amount for this work. The last legislature appropriated \$10,000 for the project, but it is conditioned on a similar federal expenditure, and cannot be otherwise used. Chairman Chase says the preliminary work will be attempted on the reclamation board funds so far as they will go, since the federal government has failed to allow for its share of the expense. The proposed dam is designed for the benefit of the Burbank and neighboring irrigation projects.

THE PACIFIC CENTRAL DISTRICT

HEALDSBURG, CAL.—An election for \$20,000 to purchase a park and improve the sewer and light systems is planned here.

OAKDALE, CAL.—Estimates have been prepared by H. S. Crowe, president of the Oakdale irrigation district, giving the probable cost of the proposed Molones dam at \$1,469,490.

RICHMOND, CAL.—The Pacific Oil and Lead Company will install 40 horsepower additional motors. This load will be served by the Western States Gas & Electric Company, Richmond division.

OROVILLE, CAL.—E. W. Beardsley, superintendent of the Great Western Power Company, has announced that the work on the Caribou Power Plant will be completed by October or November of 1920, which is six months in advance of the date expected.

MARYSVILLE, CAL.—The city council has granted the Sacramento Northern Railroad Company a permit to erect a freight and passenger station on their lot at E and Second streets, at a cost of \$30,000. The construction will cover

a depth of 320 feet. The width of the building will be about 100 feet. Material is on the ground.

OAKDALE, CAL.—To take care of the constantly increasing demand for water in the Oakdale irrigation district, the directors are planning on buying a steam shovel to be utilized in widening and deepening the canals. The estimated cost of the steam apparatus is \$10,000.

STOCKTON, CAL.—The National Paper Products Company has made application to the Western States Gas & Electric Company for service for 250 horsepower in motors which they are adding to their present equipment. The paper company's present load amounts to 1100 horsepower, which operates approximately 65 per cent load factor.

SONORA, CAL.—A little over one mile of the long tunnel that will be a part of San Francisco's Hetch Hetchy water system has been completed, and progress at the rate of approximately 175 feet per day is now being made. The tunnel will be a fraction over 18 miles in length and will be the link in the wonderful aqueduct that will connect Early Intake with the proposed dam near Priest's station.

WOODLAND, CAL.—Construction of a two-mile spur railroad track into the Conaway 32,000-acre tract is to be started by the Sacramento Northern Railroad. The poles and ties have already arrived. B. F. Conaway is to bear the brunt of the expense. The new spur will mean that heavy shipments of rice from the Conaway farm will be brought to the Woodland mills and warehouses.

BAKERSFIELD, CAL.—A special election was held recently in the proposed Kern County Water Works District No. 1, at which was submitted the proposition of forming a district and incurring an indebtedness of \$40,000 by the issuance of bonds of the district to pay the cost of the proposed improvement. Bonds will bear interest at the rate of 6 per cent per annum, payable semi-annually.

OLINDA, CAL.—Consulting Engineer Thomas Means of the Happy Valley irrigation district, Shasta county, accompanied by State Engineer McClure, came up from San Francisco to investigate and inspect the foundation of Messelbeck Dam, now under construction on Cottonwood Creek, near Ono. The Happy Valley irrigation district system, when completed, will irrigate some 18,000 acres of rich land in Happy Valley.

AUBURN, CAL.—A large number of ranchers from Placer county held a conference in Auburn with A. C. Adams, chief of the Irrigation Investigation Bureau of the U. S. Department of Agriculture, and H. M. Cooper, representing the Pacific Gas & Electric Company. Unused water from the upper power ditches of the company is desired for irrigating 9000 acres of land recently opened to cultivation and fruit. A meeting before the Railroad Commission has been arranged.

SAN FRANCISCO, CAL.—While the records of the Mercantile Trust Company showed recently that over 96 per cent of the stockholders of the Northern California Power Consolidated had deposited their stock in assent to the sale of the properties to Pacific Gas and Electric, it appears that the very small minority comprises vigorous protestants against the terms of the sale. These have taken the necessary steps to formally oppose the transaction when it comes before the Railroad Commission, and have already filed their protest.

PARADISE, CAL.—Distribution of water over the Paradise irrigation district system has been cut off for a few days as the result of 40 feet of the main canal going out. The section out is between the dam and the intake, and a flume is being constructed to carry the water past the point. It is now proposed to put in a 36-inch pipe for the main canal at some time in the future. It is estimated that this, with other improvements, will cost \$140,000. A bond issue will be necessary.

FRESNO, CAL.—Preliminaries for the formation of the Merced irrigation district have been completed. The district when organized will be the second largest district in the state of California, the largest being the one in Imperial Valley. The plan of the district is to store the flood waters of the Merced river, but this will not disturb any of the prior rights to the waters of that river. The promoters have in view a reservoir six miles long by two miles wide on Dry Creek, near Merced Falls on the north side of the Merced river, to impound the flood water.

SAN FRANCISCO, CAL.—Bondholders of the Pacific Power and Light Company in San Francisco and vicinity will be interested to learn that the Public Service Commission of Washington has rendered a decision fixing the reasonable valuation of the company's properties, serving Yakima, Walla Walla, Goldendale and White Salmon, the company's division known as the "Eastern Washington Section," at \$6,207,532. It is on the basis of the valuation of this section that the Public Service Commission has taken under consideration the granting of an increase of rates for which the Pacific Power and Light Company has made application.

REDDING, CAL.—The Railroad Commission has decided recently that purchase of the Northern California Power Company's electricity distributing system, within its corporate limit, may be made by the city of Redding for \$42,401, instead of having to pay \$226,301 for the company's holdings. Several policies adopted by the commission in the case set a precedent for future decisions in similar cases now pending. Valuation of the plant was based on reproduction cost, as shown by prices of material and labor during the year immediately preceding the date of the application, less actual depreciation. Formerly it was the practice to base valuation figures on the costs incurred during a long period of years.

SAN FRANCISCO, CAL.—Three San Francisco financial institutions recently purchased \$5,570,000 of Hetch-Hetchy 4½ per cent bonds, the money to be used in the construction of the Hetch-Hetchy dam in the Tuolumne river. At a later date the same syndicate will take \$430,000 more of the bond issue, having agreed to purchase \$6,000,000 at the time the contract for construction of the dam was let to the Utah Construction Company.

THE PACIFIC SOUTHWEST

LOS ANGELES, CAL.—The Perris Valley Irrigation Company has been granted a certificate for increase of its capital stock to \$26,000.

BRAWLEY, CAL.—An election will be held on September 15 to vote on \$2,500,000 district bonds, for irrigation and canal improvements recommended by the state bond commission.

LOS ANGELES, CAL.—The Los Angeles Railway Company will erect a new office building at the northeast corner of Broadway and 11th street, to cost \$400,000, as announced by W. H. Dunn, president.

LOS ANGELES, CAL.—A dam will be constructed in Thompson Creek, northeast of the Gale Goat Ranch. A dam will also be constructed in Live Oak Canyon in the gorge below Camp Eno. The reservoir will hold 400 acre-feet of water and will be large enough to hold the water from any storm.

LOS ANGELES, CAL.—Application has been made by the Pacific Electric Railway for authority to construct spur tracks at the grade crossing on Central Avenue to serve the Good-

year Rubber Company plant on the Ascot Park property.

SANTA BARBARA, CAL.—Santa Barbara Gas and Electric Company is asking for bids from the holders of its first mortgage serial and sinking fund gold bonds, due July, 1941. The company wants to pay off \$240,000 face value, and asks the price desired for the same. These bonds were marketed here last year by E. H. Rollins & Sons.

PASADENA, CAL.—The Warnerlite Company of Davenport, Iowa, manufacturers of lighting plants and electrical products for automobiles, will start within six months in Pasadena on the construction of a \$100,000 factory building to form the first unit of a plant in Pasadena that will manufacture products to supply the Pacific Coast and export trade of the company.

LOS ANGELES, CAL.—Southern California Edison Company is making the formal offer to its stockholders, as authorized by the Railroad Commission, of subscription to the new issue of 25,000 shares. Each stockholder of record August 15 may subscribe to as many shares as he desires, but the company reserves the right of final allotment pro rata to the present holdings. The price fixed is \$90 per share, payable in cash, or \$91 a share, payable \$6 with the subscription, and the balance at \$5 a month. Any of this stock left unsold on September 1 will be offered to the public.

IMPERIAL, CAL.—A project for the irrigation of the Imperial Valley by construction of a canal across the southern extremity of California at a cost of \$30,000,000 has been presented to President Wilson by J. R. Swing, Mark Rees, O. N. Shaw of the Imperial Valley and Thomas C. Yager of Coachella Valley. The purpose of the project is to prevent the waters of the Colorado river, now being drained by the Alamo canal, from being exclusively utilized by Mexico. The Alamo canal is a wasteful project, they say, and eventually will turn a section of 500,000 acres into an arid territory. The \$30,000,000 expenditure has been approved by Secretary of the Interior Lane.

THE INTER-MOUNTAIN DISTRICT

REXBURG, IDA.—This city has just granted a renewal of franchise permitting the Utah Power & Light Company to operate within its limits until July 1, 1969.

TREMONTON, UTAH.—Work has been begun on the installation of a new street lighting system for this city. The new installation should be in operation by September 1st.

BONNER'S FERRY, IDA.—The Washington Electric & Supply Company of Spokane is considering the matter of installing a street lighting system here, to include 14 lamp posts.

PUEBLO, COLO.—Three large coal mines operating in Canon City district are negotiating with the Arkansas Valley Railway, Light and Power Company for additional power service aggregating 1500 horsepower.

PROVO, UTAH.—The Utah Irrigation Company are considering the advisability of installing additional pumps at their plant near Saratoga. This is one of the largest irrigation projects in the intermountain country.

LIBBY, MONT.—It is reported that the Lukens-Hazel Mining Company will expend \$240,000 for a 200-ton concentrator and power plant. A pipe line will be installed from Granite Creek which will develop 600 horsepower.

BRIGHTON CITY, UTAH.—The Utah Idaho Central Railroad Company has been given permission by the Public Utilities Commission to tear up its tracks in this city, due to lack of sufficient business to pay operating expenses.

IDAHO FALLS, IDA.—About two thousand acres of land located about one mile west of Bassett on the railroad between Idaho Falls and Roberts has been reclaimed by the installation of electrically driven pumping equipment for irrigation.

SALT LAKE CITY, UTAH.—The Dixie Power Company has made formal application to the

Public Utilities Commission for permit to construct one hundred miles of transmission line from Cedar City through Iron and Washington counties to St. George.

PUEBLO, COLO.—An industrial development corporation is being organized in Pueblo for the purpose of raising a fund of \$50,000 to be devoted to research work and securing data concerning its resources, to be used in a campaign to induce factories to locate there.

RIGBY, IDA.—Electric service to this community will be improved by connection of the system to the Grace plant in addition to the Idaho Falls plant of the Utah Power & Light Company, the Grace plant being the main source of supply for the entire system of the company.

OGDEN, UTAH.—Owing to the large number of fires in the industrial section of this city, presumably started wilfully, a concerted movement has been started toward the installation of protective flood lighting in the hope that this will materially cut down the work of the vandals.

LOGAN, UTAH.—An ornamental street lighting system will shortly be installed on the campus of the Utah Agricultural College. Steel fluted lamp posts on a cement base will be used and each will be mounted with a 400-candlepower lamp. This new lighting installation is part of a scheme to make the college grounds one of the most beautiful in the entire West.

BUHL, IDA.—The directors of the Jarbridge-Buhl Mining Company have contracted with the Idaho Power Company for a power line leading up from Jarbridge to the Altitude property. The cost of this power line and transformers will be about \$8,500. The directors will spend about \$500 for compressors, drills and electric hoists, bringing the total to \$11,000.

CARSON CITY, NEV.—The Tonopah Divide and Goldfield Electric Railroad Company has been incorporated under the laws of Nevada for the purpose of operating an electric railway between Tonopah and Divide, a distance of six miles. Charles Stout, of Reno, heads the incorporators. The road will cost approximately \$1,000 per mile, a total of \$6,000, exclusive of equipment. Eventually the line may be extended to Goldfield.

BOISE, IDA.—The Idaho Power Company has placed orders for machinery necessary for installation of a new 8000 horsepower addition to the plant at Thousand Springs on Snake river. The surveys necessary to prepare all plans and specifications in connection with the new installation have been completed, and by October 1st the company will have a large crew of men at work at Thousand Springs for the purpose of completing the building so as to receive the machinery as soon as shipped. The manufacturers of the machinery have promised shipment in plenty of time so that the entire plant will be finished and in operation prior to the beginning of the 1920 pumping season. Additional improvements have been authorized for installation of control gates and for dredging operations at the Swan Falls power plant.

IDAHO FALLS, IDA.—Work is well under way on the construction by the Utah Power & Light Company of the 44,000-volt transmission line to be constructed from Grace to Idaho Falls, via McCammon, Pocatello, Blackfoot and Shelley. The Idaho Power Company will build the section of lines between Pocatello and Blackfoot. The Phoenix Utility Company is doing the rest of the work under contract for the Utah Power & Light Company. In addition to the main trunk lines, an extension will be made southward from McCammon to Downey. In the Idaho Falls division a new 44,000-volt transmission line will be constructed from Idaho Falls station nearly to Roberts, and extensive improvements will be made in the entire territory between Idaho Falls and Rigby. The main transmission line is to supply additional power needed in the Idaho Falls territory and to effect an interchange with the Idaho Power Company mutually beneficial to both companies.

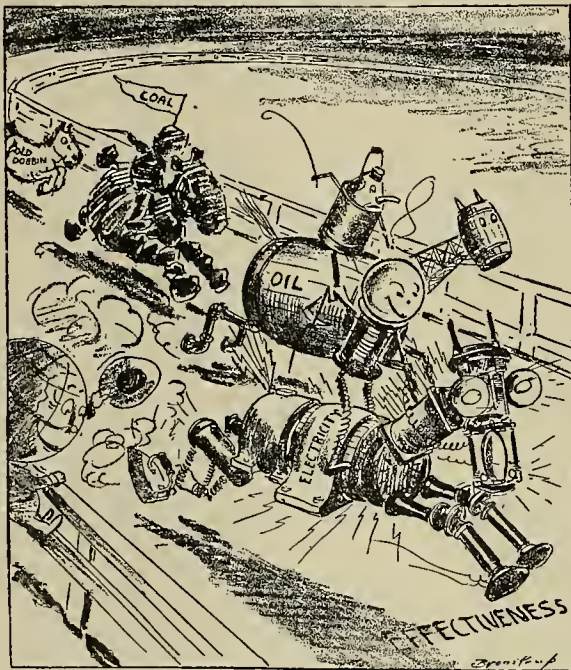
THE VACUUM CLEANER

THE VACUUM CLEANER

MULLIGAN is the most famous of all camp dishes—and one of the best. Like this page, it contains a little of everything left in camp, seasoned with a bit of onion and served when piping hot. In an editorial office such bits of good material, not being edible, are likely to collect in corners and drift about until picked up eventually by the Office Vacuum Cleaner. In order to preserve them for the interest of our readers, this page has been turned over to that electrical worthy for their display. Season with a bit of humor—and serve hot.—The Editor.



THE MODERN INDUSTRIAL RACE



This cartoon, by Bronstrup, appeared not long ago in the San Francisco Chronicle. We agree, of course. That's why we reproduce it.

"John Doe" appears to be a mysterious character whose name is badly mixed up with that of former soldiers and sailors who served Uncle Sam during the World War. The War Risk Insurance Bureau sent thousands of specimen insurance policies to returned service men to show just what benefits and advantages Uncle Sam provides for them in recognition of the services they rendered their country. These policies are filled in as a matter of form with the honored name, "John Doe."

Scores of these policies have been returned to the Bureau by anxious service men who fear that an error has been made and that one of their pals is being discommoded because of the fact that his insurance policy is in their hands, being unaware, evidently, that "John Doe" is a name which has been used in legal parlance to designate an unknown party since the days of Blackstone.

"Am returning policy addressed to me, that you may rectify the mistake," said one of these letters, "and deliver it to the proper party. The name of the man to whom the policy is made out is not my name."

By the way, what various vicissitudes might enliven the existence of a man whose name really was John Doe.

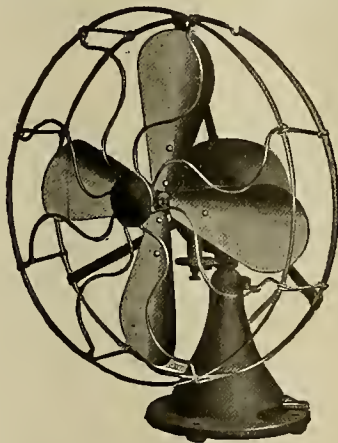
Speaking of modern improvements—wouldn't old Cleo have been silly with joy over one of our present-day fans, and what more naughty things history



would have had the gossipy exhilaration of recording as liabilities against the character and conduct of old Nero had that overgrown kid possessed a medical shocking coil!

—EMERSON EASTERLING.

FOOLISH SELLING ARGUMENTS—I.



If musical customers are troubled by not being able to keep the tune, this will give them the air.

JOURNAL OF ELECTRICITY

VOL. 43 NO. 6

SAN FRANCISCO, SEPTEMBER 15, 1919

PER COPY, 25 CENTS

HUGHES Electric Range Sales Service Manual

Let this book furnish the answer —

Here is the book you Range Dealers have been waiting for! Filled from cover to cover with practical suggestions on range merchandising — every suggestion backed up with live, strong, cooperative material — you need it before going after range sales aggressively. Look at the pages pictured here! Just a sample of what is between those two covers.

It's yours! Write for it!

Then go after the range business in your territory fully prepared.

Pacific Coast dealers please write our Ontario office — others, write Chicago.

See our displays at the Electrical Shows;
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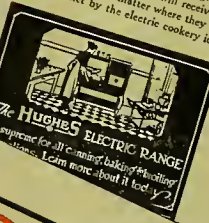
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NEWSPAPER ADVERTISEMENTS



How to use movie lantern slides to advantage

of not publicity ranges slides to There is, aside verising Your e news- received mails; demon- electric



Street car advertising is a useful part of your publicity on the electric way of cooking

THE same reasons for your using movie campaign slides in furthering your range your advertising will demand that you round out Have your ever noticed that as a rule the merchants who use street car cards regularly are those who stand head and shoulders above the rest in your city? Also, have you noticed that you often see an article newly advertised in the street cars long before mentioned in the national



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(Date)

SIMPSON,
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has: The next time you are downtown
ity of our office we hope you will
int to stop and look at the very
display of electric ranges we
ay is doubly interesting because
ly observe the very attractive
these splendid ranges, but can see
operation
ry good point of the electric is
rent to the modern housewife
sonder tens of thousands of
been sold during the last
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ve advantages of electric
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to send you a copy of our
eips book "What Every
and you will signify it
be delighted to mail
r compliments
so vital—so modern and
fial to twentieth
ve know you will
e truly,
LIGHT AND POWER CO.
(Signature)
Business Manager.

GEYSER YOUR HOME

HOT
WATER
WHEN
YOU
WANT
IT



“Our Boys Have Learned to Trust Those Red Bands”

In plants where production depends on motors—you will find an unmistakable confidence in the Red Bands of the Howell.

On the basis of *proven ability* the Red Bands have a definite meaning for the owner who wants profits, the plant manager who is responsible for keeping up production schedules, and the boys whose earnings *increase or decrease* with their output.

This preference for the Howell Red Band Motor has been built up by three features which char-

acterize Howell construction (1) The Patented Rotor Re-centering Bearings which compensate for wear. (2) All Howell Motors are wound with Enameled Double Cotton Covered Wire. (3) The End Rings are Cast Directly to the Rotor Bars.

When you see a Howell Motor you will always see the Red Bands on the ends of the housing—they are the visible evidence of our determination to keep faith with Howell users in every corner of the world—they are your surety of motor performance.

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Pacific Coast Representatives: Garland-Affolter Engineering Company; Seattle, Los Angeles, San Francisco

HOWELL RED BAND ELECTRIC MOTORS

JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

CLOTILDE GRUNSKY, Associate

VOLUME 43

SAN FRANCISCO, SEPTEMBER 15, 1919

NUMBER 6

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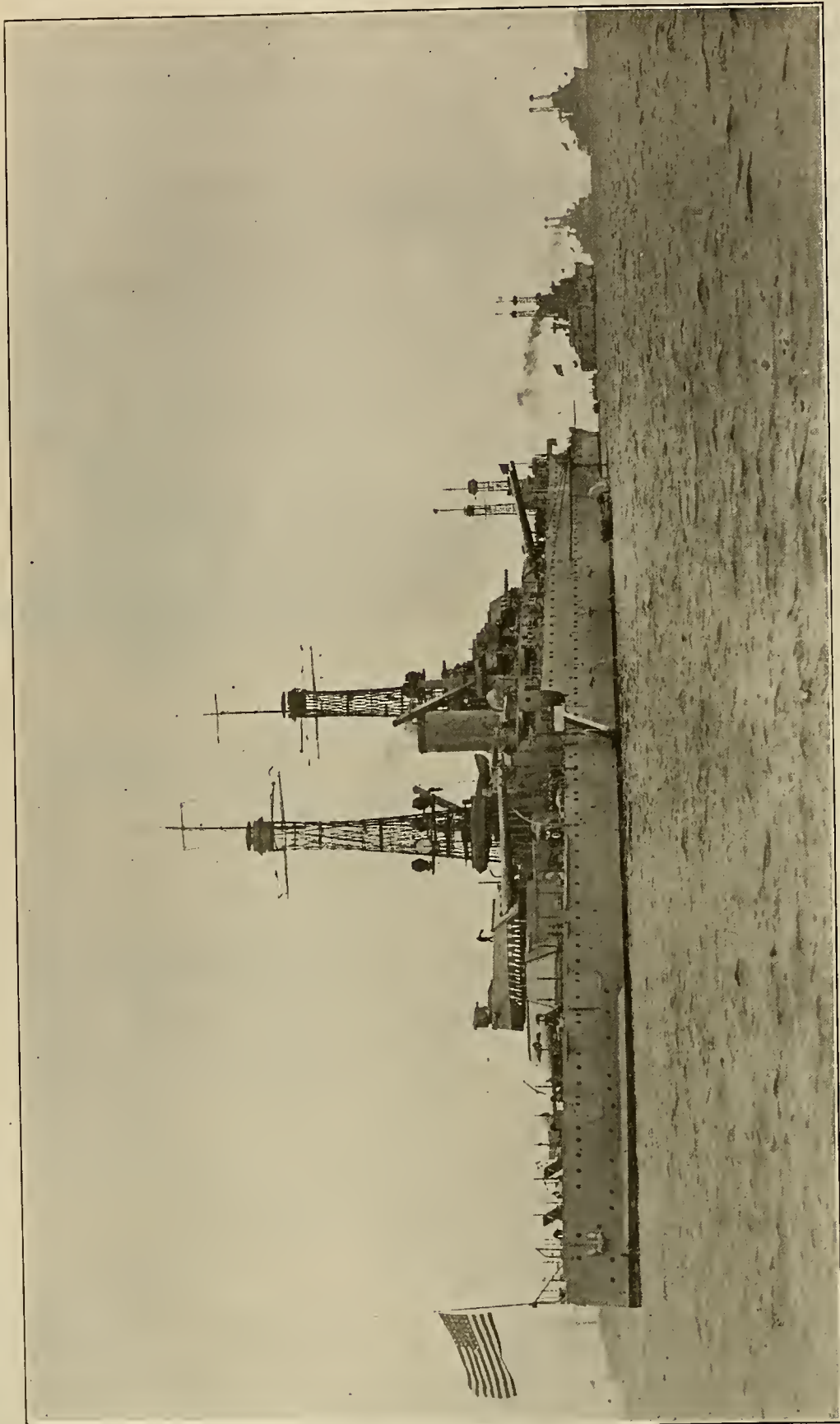
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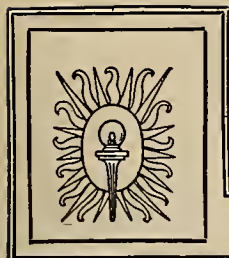
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ARTHUR H. HALLORAN
Secretary
R. J. DAVIS
Treasurer



THE SUCCESS OF THE ELECTRIC BATTLESHIP.—The famous electrically driven New Mexico as the flag ship of the Western fleet has played an important part in the gala events of the fleet's present visit to Pacific ports. Not only has the electric drive proven satisfactory in the simplicity of its operation and the economy of space and elasticity of arrangement which it makes possible, but it has already established a world's record in the economy of fuel through all ranges of speed. The interest of the navies of the entire world has been focused on this latest advance in naval construction and there seems to be no question but that the battleship of the future will be electrically propelled and fitted throughout. It is a matter of pride to the electrical West that this finest ship of the American navy should be named after a Western state and that the sister ship of this type now under way should also be a Western product, built at Mare Island Navy Yard, and named the California.



JOURNAL OF ELECTRICITY



DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43

SAN FRANCISCO, SEPTEMBER 15, 1919

Number 6

(Copyright 1919 by Technical Publishing Company)

ANNOUNCEMENT BY JAMES H. MCGRAW

PRESIDENT MCGRAW-HILL COMPANY, INC.

In former years I have visited this beautiful section of our nation west of the Rocky Mountains, felt its charms, and returned to the East enthused with the vast business possibilities here. My present visit has already lasted six weeks, and in this time I have from the High Sierras to the Sea undertaken a personal inspection of what men of the electrical industry are doing here, and have noticed with unusual interest the splendid vision of engineering and industrial possibilities you have in store in this growing section of our nation.

In making my observations here I could not help but note the effective work the Journal of Electricity is doing in fostering your vision of things electrical on the Pacific Coast, and it has been with an earnest desire to bring about a means whereby the Journal of Electricity can be used more effectively in supplementing the bigger work of Electrical Merchandising and Electrical World in carrying this magnificent vision to the entire nation and to the world at large that announcement is here made that in future the Journal of Electricity will be affiliated with the family of engineering and technical papers published by the McGraw-Hill Company, making eleven in all.

These three electrical papers will enable us to intensively carry your vision in the West to the East. People of the East have a full appreciation of the Western climate as ideal for play and rest, but have you in a large way shown them what this climate means industrially—that the manufacturers can produce here more cheaply, given equal wage and material costs, than elsewhere, because of climatic advantages and because of your vast natural resources in agriculture, minerals and water power, and your enthusiastic spirit of daring in engineering and commercial endeavor?

This is the new vision for which the East is looking and Electrical World, Electrical Merchandising, and Journal of Electricity are at your service to carry this great message home. The Editor of the Journal of Electricity, Mr. Robert Sibley, formerly professor of Mechanical Engineering at the University of California, and professor of Electrical Engineering at the University of Montana, will become Pacific Coast Editor of Electrical World and Electrical Merchandising, and the Journal of Electricity will continue to be published in San Francisco.

In this new vision of things Journal of Electricity will in its local field—in the Americas west of the Rockies—continue its magnificent upbuilding work now a tradition of thirty-two years standing. Electrical World, the voice of the electrical industry, will carry the message of the engineer in the West to the nation as a whole and to the world at large, while Electrical Merchandising will devote with even added effective emphasis its columns and editorial worth toward carrying to every state of the Union the vision of cooperative helpfulness in merchandising of electrical ware that has been developed on the Pacific Coast to such a high degree of attainment.

Thoughtful men see in the year 1920 a year of unusual promise for the West. Three conventions of vast importance to the electrical industry the world over are to have their national setting west of the Rocky Mountains during the Spring of next year. The success of these conventions, the National Electric Light Association at Los Angeles, the National Association of Elec-

The New Vision for 1920

trical Supply Jobbers at Del Monte, and the World Foreign Trade Congress at San Francisco—means much for the future of the West.

We must use our channels of engineering and technical expression with the highest degree of efficiency in carrying the message broadcast the nation over concerning the present wonderful development we have here, and the untold possibilities of further development in this favored district where already,

according to recent census statistics, we can show a per capita use of electricity four times the per capita use in the United States as a whole, with water powers still undeveloped equal to seventy per cent of the water powers of the nation, and yet with but 6.7% of the total population of the nation resident here.

It has fallen to the fortunate lot of the Journal of Electricity in past years to champion the great West in its wonderful development, portraying the viewpoint of a vision radiating from the West to the world without. In this same period Electrical World and Electrical Merchandising, published in New York and having national circulation, have caught this same vision and disseminated its helpful message to influential circles—national and international—not reached by the Journal of Electricity.

The question that has perplexed the editors of the three papers has been as to how these three papers, representing as they do the pulse of the electrical industry in the United States, might the better in their respective fields carry this message to the world at large along the lines of mutual co-operative helpfulness that is so emphatically the spirit of the times.

The West is to be congratulated that in the future the three great electrical papers, Electrical World, Electrical Merchandising and Journal of Electricity under the management of the McGraw-Hill Company, will carry the wonderful vision of the West to all the known world in a manner that means that our engineering and commercial vision of things electrical will reach the ear of the industry the world over in the most efficient and telling degree possible.

Among the many fine fighting ships coming to the Pacific Coast as part of the new Pacific Fleet, the electrically driven battleship New Mexico, chosen by Admiral Rodman as his flag ship, represents a radical departure from

the old methods of transmitting power from the engines to the propellers. Instead of a rigid mechanical connection of the propelling engines to the driving shaft either direct or through complicated arrangements of turbines and reduction gears, the power of the New Mexico's steam turbines is used to generate electricity which is transmitted through cables to electric motors mounted on the propeller shafts. In comparison with the most modern geared turbine drive as used by foreign navies, which involves sixteen turbines in all with a complicated system of valves, piping, condensers and auxiliaries, the propelling machinery of the New Mexico consists of but two main turbo-generators with their condensers and four electric motors, one for each propeller.

The electric drive possesses a further advantage over the geared turbine arrangement for naval vessels in that it is possible to construct the motors with two windings, thus obtaining two speed ratios between the motors and generators. It is thus possible to vary the speed of the ship from a cruising

speed of ten knots to a maximum speed of twenty-one knots by a variation in speed of the turbo-generators. By this means an exceptionally high economy in fuel consumption is obtained at the cruising speed points, thus adding to the radius of action of the vessel. Tests have shown the New Mexico to possess a higher efficiency in oil consumption throughout her full range in operating speeds than any ship of her type and class afloat.

Some of the advantages of the electric drive as installed on the New Mexico over geared turbines and other methods of propulsion may be briefly stated as follows:

1. Simplicity and Reliability: Under cruising conditions, one turbo-generator has sufficient capacity to supply the power required for all four propeller motors, the second turbine being cut in only when full speed is desired. In case of failure of one turbine it may be isolated immediately by merely opening a switch and all four propellers operated from the remaining turbine.

2. Installation: The motors may be connected to the propellers by short shafts and the turbo-generators located at any desirable part of the ship where a maximum protection against damage by torpedo and gun fire may be secured. This flexibility in location of the machinery is considered by naval experts to give an enormous advantage to the electric drive.

3. Economy: The saving in fuel consumption will range from fifteen to thirty per cent over direct connected turbines or reciprocating engines and ten to fifteen per cent over geared turbines.

4. Manoeuvring Qualities: The turbines always rotate in the same direction, reversal of the propellers being obtained by throwing a switch which reverses the motors. Also full power may be obtained on reversing. These operations may be performed instantly and accurately with no possibility of damage to the equipment by establishing a wrong connection.

5. Weight and Cost: The electric drive permits a considerable saving in weight as compared with the direct turbine or reciprocating engine drive, although there is but slight difference as compared with the geared turbine arrangement. There is not sufficient difference in cost to be considered of any importance.

6. Low Maintenance Cost: The electric drive possesses a minimum number of moving parts which are in no way subjected to injury or excessive deterioration through vibrations in the ship's structure, wear in the bearings or lack of rigidity in the mountings. The cost and delays due to maintenance and repairs may therefore be considered to be materially less than for other types of equipment.

There may still remain some question in the mind of the dealer as to whether it pays him to handle nationally advertised goods on a small discount in preference to unknown material which yields a greater commission. The argument which occurs to the dealer in favor of the unadvertised appliance is ably presented by a Western contractor-dealer in the August 15th issue of the Journal of Electricity. The national advertiser's viewpoint is given elsewhere in this issue.

There is an undoubted attraction to the dealer in being permitted a sufficient leeway in returns to do his own local advertising and thus bring his store itself before the public, but successful returns from such a policy are made possible only by the fact that national advertisers have made ready the way. It is only because the idea of an electric washing machine has already been sold to the housewife that she is ready to answer the local advertisement of a machine she never heard of before. And it is not to be supposed that it would be possible to stop the flood of national advertising today and still continue to reap the golden harvest of public interest. It has been

the experience of more than one industry that an apparently impregnable position has been lost through lack of publicity. The lumber industry, for instance, just recently awoke to the fact that through lack of advertising on a big scale, they had been supplanted by concrete and plaster, brick and paper, and were in danger of completely losing their market. The national campaign now under way is the result.

The electrical industry in a very real sense is founded on selling the electrical idea through national advertising. This advertising might conceivably be generalized and carried out by a cooperative system, but it is difficult to visualize a means by which such vast sums of money as are now invested in advertising could be collected in the first place and secondly, how they could be made to yield the adequate return to those providing the money, an essential item in any practical business arrangement.

We are in large measure dependent, then, on the national advertiser, who advertises his wares to make a profit on them. Naturally, the only way in which he makes a profit is through the avenue of the dealer who passes his ware on to the public. In the interest of the industry as a whole, upon whose prosperity his own depends, the dealer cannot afford not to tie-in with national advertising.

Complete cooperation between the daily newspaper and the electrical industry is a development soon to be attained, it is hoped, for the business benefit of both. A classic example of what full and extensive press publicity can do, in conjunction with intelligent advertising, is the steady upbuilding of the automobile industry. Because they work in almost perfect accord with manufacturers and dealers, it is possible for newspapers to issue scores of special automobile pages—whole sections—profitable at once to the newspaper, the industry, the motorist.

Much remains for the electrical industry yet to accomplish to secure similar representation before the public. Important steps have of late been taken in this direction, both in the East and the West, by newspapers working in co-operation with contractor-dealers and central stations, to build up regular pages and departments devoted to the selling of electrical wares and electrical service. Several New York, Chicago, and Cleveland papers have found that such pages are big business-builders, and all have at least one solicitor devoting his energies exclusively to the electrical trade, while some have built up a staff to handle the development. It is expected that a large San Francisco evening journal will soon launch upon this well repaying project.

Not only the large city dailies find profit in these organized "drives" by electrical concerns for more business. Let a concrete example be offered: a news-

paper in a city of 35,000, in New York State, which in three weeks' time gained 20 half-pages of advertising through commissioning a special solicitor to canvass the electrical trade in that city. This was possible, of course, only because of the added business brought by the "massed advertising" and the electrical news-matter printed by the paper.

Newspapers of the West appear to be overlooking a paying prospect. Electrical interests, moreover, have by no means gained full value from co-ordinated advertising. This whole field needs cultivation. It must be done in a broad way, so that the press shall formulate a definite helpful policy toward the electrical industry. It is a progression which electrical development organizations throughout the West, such as the California Electrical Cooperative Campaign, might profitably promote.

The resignation of A. E. Chandler from the California State Water Commission leaves the way open for the appointment of a man along the same lines as Mr. Chandler himself, a specialist in the field of water development and water law, or the appointment of another "business man," who, however worthy, must be dependent upon the advice of others for the basis of his decisions.

The principle of the appointment of an engineer to fill a position so frankly requiring an engineer's judgment cannot be too strongly advocated. The experience of the war commissions and administrators is striking proof of how successful the policy of utilizing experts may be and in most cases, how inadequate the non-expert.

The argument in favor of the appointment of laymen is, of course, that strict neutrality in judicial positions is best achieved by a man who approaches the question with no bias of prejudice through his knowledge of the subject and that a competent business man of a high moral character is the best type of commissioner in any field, however technical.

It is difficult to believe that knowledge on engineering subjects clouds the judgment on engineering matters and the refusal to appoint an expert on the ground that he was an expert would be as absurd as to bar all lawyers from judgeships because they had a knowledge of the law.

It cannot be too strongly pointed out, moreover, that the engineer is a business man, with as broad an experience and as comprehensive a citizenship as the corresponding group of men of commercial training. Other things being equal, that is to say with a big man under consideration in both cases, the man with an engineering background should be the logical appointee for the present position. It rests with the engineering profession to furnish a candidate of such calibre.

NEW JOURNAL SERVICE: The new affiliation of the Journal of Electricity opens up a wider possibility of service to the West and our readers should look for important improvements in these columns during the coming months. It is because the paper was good that we have been given this backing—under this new stimulus we now intend to become better. The Journal of Electricity will continue to be published in San Francisco and to represent Western industry. Our aspiration remains the same: "Devoted to the upbuilding of the electrical industry in the West."

An Electrically Driven Battleship

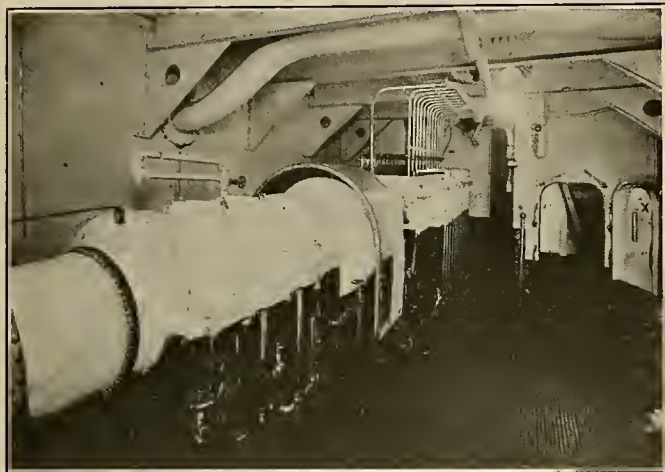
BY C. M. RIPLEY

(The arrival of the fleet on the Pacific Coast makes this account of the electrically driven battleship of particular interest at this time. The complete electrical equipment of the "New Mexico" and the proven advantages of electric drive are here described by one of the electrical engineers of the General Electric Company of Schenectady, N. Y., who was aboard the vessel on the occasion of her trial trip.—The Editor.)

Among the battleships of the United States Navy, none is of greater interest than the electrically driven New Mexico. This latest leviathan weighs 32,000 tons and requires 32,000 horsepower, or one horsepower per ton.

A Smokeless Fire Room —

Like everything else that is electrical, the New Mexico is the cleanest institution of her kind. There



After end starboard inboard shaft alley on board the U. S. S. New Mexico, showing thrust bearing

are no engines or turbines connected with the propeller shafts—only motors. There are no grates under the boilers—merely oil burners. There is not a coal or ash shovel on the ship; nor are there any cinders, smoke, dust, or soot.

The air in the fire-room is maintained at a higher pressure than the outside air, and with a greater proportion of oxygen. This increased pressure and increased oxygen are both useful in providing the proper combustion in the boiler.

There are seven openings in the front of each boiler and in each opening is an oil burner or nozzle at the end of a small pipe. The nozzle is a patented arrangement by which the oil is atomized by centrifugal force, although the nozzle is stationary. There are no air pipes supplying air to the boilers as the fireroom itself is one big air pipe. The air rushes in around the nozzle and while doing so it is given a rotating motion by stationary vanes which resemble the blades of a fan but which do not move. The atomized oil in the spray meets with this inrushing air, and the combination makes a perfect mixture which is practically smokeless.

Boilers —

There are three boiler rooms, each in a separate compartment, and each room contains three large boilers. Each of these nine boilers can deliver over 4000 horsepower and contains three miles of 2-in.

seamless pipes. They deliver steam at a pressure of 250 lbs. per square inch.

Two Power Plants —

For propulsion there are two electric power plants in separate compartments.

In two separate steel compartments 15 by 45 ft., are located the two turbine generator sets, each not over 27 ft. long.

The engine rooms of most ships of the past have been a tangle of bending and curving pipes. When one of these pipes burst, it practically meant the death of every man in the engine room. One of the advantages of these power plant rooms in the New Mexico is the fact that there is only one steam pipe in the room, and that is only 16 ft. long.

Electric fans in the power plant ventilate the room and also cool the generator, and the heated air is pumped outside.

Switchboards —

Eight copper wires convey the 16,000 hp. from the power plant room to the electric switches back of the switchboard. Here the ship is controlled upon receipt of instructions from the captain, sent either by loud speaking telephones, by indicators, by lights, or by messenger. Following these instructions, the engineers standing at the switchboard can start the vessel forward, or start it backwards; they can make it go at many different speeds in either direction; they can run all four of the motors from one of the power plants, or from the other power plant; they can even split up the load so that one power plant will run two of the motors forward and the other power plant will run the other two "astern." Another combination they can effect is that both power plants can equally share the load of driving the four motors—one to each propeller.



The U. S. S. New Mexico, the first electrically propelled battleship

If one of the propellers becomes foul, the engineer can disconnect this motor from the circuit, and then all of the power in the two power plants is available for the three remaining motors.

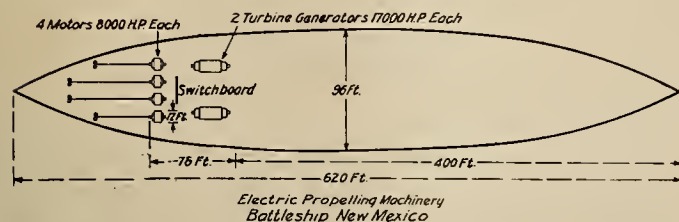


Diagram showing the location of the New Mexico's electrical machinery

Motor for Each Screw —

One motor is provided for each of the four propeller shafts. The screw is at one end of the shaft in the water, and the motor is at the other end of the shaft inside the ship. One reason for their efficiency is the fact that the shaft can be short as the motor can be close to the propeller. There is an additional advantage also, because the turbine generators can be located near the boilers, and this permits of a short steam pipe. These very desirable features are a result of electric drive, because it makes no difference what is located between the power plant and the motors, for the copper wires can be run in any direction, and around any obstacle. This is not the case with engine or turbine drive as they have long shafts.

No Reversing Turbines —

With electric drive, no reversing turbines are necessary, the reversing being done electrically. So with the electric drive, the turbines in the power plant always run in the same direction and can be more efficient for that reason.

Electrical propulsion not only does away with reversing turbines, but also does away with reduction gears. The wonderful simplicity of the arrangement can be appreciated also when you remember that the battleship Pennsylvania has ten turbines and the New Mexico only two.

Propeller More Efficient —

Electric propulsion has another advantage in making the propeller more efficient. This is because, within limits, the faster a propeller turns, the less efficient it becomes. If it turns too rapidly, it merely churns the water, and therefore does not effectively drive the ship ahead. When turbines are directly connected to the propeller shaft, the turbine rotates too slowly to be at its best efficiency, and the propeller shaft rotates too rapidly to operate at its maximum efficiency. Electric propulsion permits the turbines to rotate at their normally high speed, where they show the best fuel economy, and also permits the propeller to operate at comparatively low speed, where it gives the best driving economy. Without electric propulsion, there were at many different speeds, practically "compromise" arrangements, by which either the turbine was rotating too slowly or the propeller too fast. This is obviated in the New Mexico, which is one reason why, with one

filling of her oil tanks, she can cruise over 50 per cent further than with any other equipment. In fact, she can go 7500 knots at 12 knots speed before it will be necessary to take on any more fuel.

Electrical Equipment —

The New Mexico is practically the only 100 per cent electric boat. Her complete electrical equipment is as follows:

2 main generators.....	33,000 hp.
4 motors for propelling.....	33,000 hp.
6 dynamos.....	3,000 hp.
6 air compressors.....	400 hp.
2 vacuum pumps.....	80 hp.
20 motor generator sets totaling almost.....	100 hp.
4 boat crane motors.....	220 hp.
2 anchor motors.....	250 hp.
4 winch motors totaling.....	200 hp.
20 turret motors.....	1,300 hp.
10 ammunition hoists.....	500 hp.
2 refrigerator motors.....	40 hp.
8 motors in kitchen.....	15 hp.
(Peel potatoes, mix dough and cake, and wash dishes, cut butter, make ice cream, meat grinder, all bread and cakes baked electrically.)	
6 in carpenter shop.....	20 hp.
10 in machine shop.....	30 hp.
6 in laundry (5 machines use electric heat).....	10 hp.
5 motors in print shop totaling.....	6 hp.
14 water pumps.....	150 hp.
4 oil pumps.....	8 hp.
50 electric air heaters.....	30 hp.
12 searchlights.....	300 hp.
160 fans, 60 blowers, 6 electric toasters, 1 electric percolator, 15 electric irons, 104 loud speaking telephones, 176 ship service telephones, 170 fire control telephones, 2 Sperry electric gyroscopic compasses, 7 portable electric drills, 2 electric glue pots, 6 electric soldering irons.	



View of the electric bakery on the New Mexico. There are eight electric G-E motors in the New Mexico's kitchen, electric irons, electric percolators and electric toasters. There is also a fully equipped electric laundry.

Particular attention is called to the loud speaking telephones, 104 in number, located all over the ship. From three different transmitting stations the bugle calls or other instructions can be sent to all or any one of five different groups of these telephones.

The navy has adopted this method as the standard ship propulsion for capital ships in our navy for the future.

Taking the Customer Into Partnership

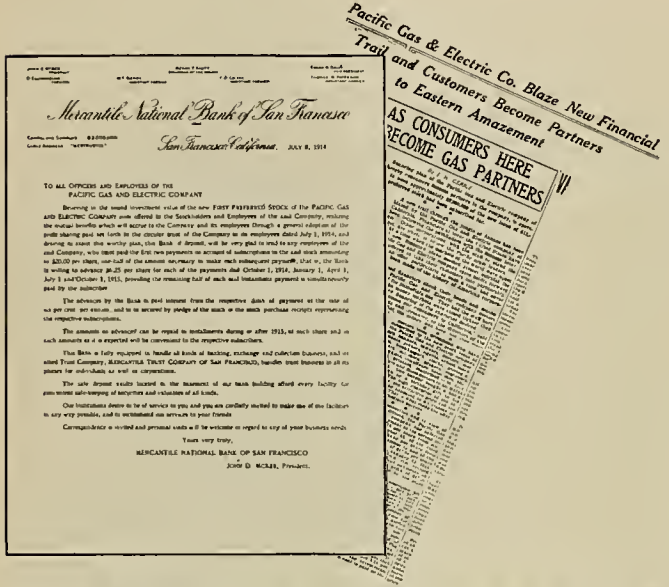
(A movement which offers a peaceful solution of the problem of private or public ownership, which provides a ready answer to the continuous demands for capital required by a growing electric utility and which promises to act as a stabilizer in that important question of distribution of property, which is at the bottom of Bolshevism—is of vital importance not only to the electric power industry but to the nation at large. The Pacific Gas & Electric Company, of San Francisco, was the originator of the plan to sell stock to customers—and under the leadership of A. F. Hockenbeamer, second vice-president and treasurer of the company, carried out a most successful campaign, the details of which are here given.—The Editor.)

Selling stock directly to consumers instead of through the usual banking channels and without the insurance feature of an underwriting syndicate was in a broad sense an experiment when first tried by

comes. It has for many years steadily accumulated a reserve for savings due to its great wealth and natural resources—gold, oil, timber, horticulture, agriculture, etc. These savings have to a considerable extent gone into securities and California has been known among bankers as an investing State for twenty-five or thirty years, as evidenced by the location in San Francisco of branches of big Eastern investment banking houses. California corporations generally sold their securities in the East in the first instance but experience of bankers is that they are gradually bought back by California investors, whose preference for our own securities is based largely on the fact that stocks and bonds of California corporations are exempt from State and local taxes.

The Undiscovered Field of the Small Investor

While the Pacific Gas & Electric Company was favored by the foregoing conditions in launching its novel and theretofore untried method of inviting its four or five hundred thousand customers to become partners in the business through the purchase of its first preferred 6% stock, it is unsafe to assume that there is not investment capital in reasonably prosperous and well established communities simply because they do not happen to be embraced in the itinerary of bond salesmen. The Government discovered this in its Liberty Loan campaigns. The Pacific Gas & Electric Company discovered it before the

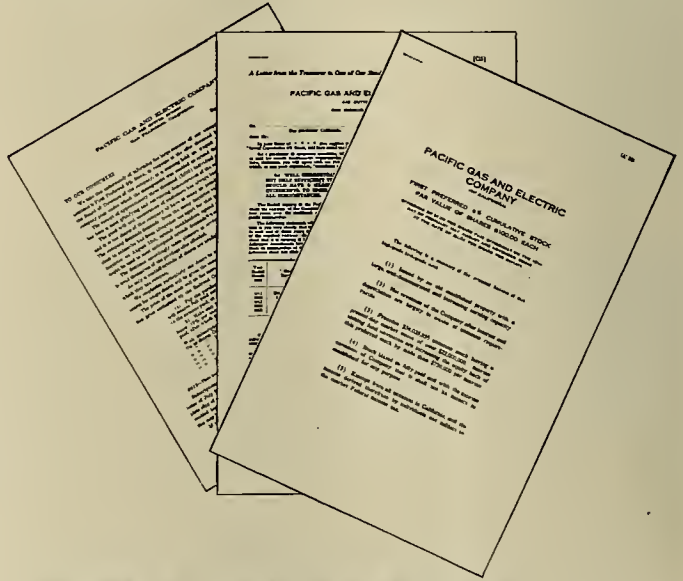


Some of the unsolicited publicity which the Pacific Gas & Electric Company's plan evoked—a circular sent out by the Mercantile National Bank of San Francisco to its customers, and a commendatory newspaper article.

the Pacific Gas & Electric Company of San Francisco, in 1914, with no precedent anywhere that would afford any guidance. The advantages in public interest and good feeling which would result seemed obvious, but the Company hesitated to enter a field which might be misunderstood. Companies which sold their own stocks under the name of conveniently organized bond houses were well known—too well known, indeed, for a reputable concern to wish to be associated with them in the public mind. This was in 1914. Today the principle of “customer-ownership” is an established one throughout the United States, and forty million dollars worth of central station securities are held by some thirty-six thousand individuals, ninety per cent of whom had never owned utility stock. A. F. Hockenbeamer, second vice-president and treasurer of the Pacific Gas & Electric Company, may be said to have been the originator of the idea and himself personally conducted the first campaign.

California a Good Place for Experiment

California was a good place in which to try the first experiment. It ranks twelfth among the states in point of population but holds first place in per capita wealth. It is exceeded by only four states in the number of incomes over \$3,000 per year and ranks second in the ratio of population to such in-



Circulars issued by the Pacific Gas & Electric Company to notify their customers of the customer-ownership scheme

Government, but before the Pacific Gas & Electric Company discovered it, the fact was well known to sellers of gold bricks and fake securities who have drawn hundreds of millions of dollars out of the

pockets of small investors to whom legitimate investment opportunities were never presented in ways that they could understand or in amounts within their reach.

The Sales Campaign

In order to reach this group of non-stock-buying public, a comprehensive sales campaign was planned:

1st. Under date of June 1, 1914, a circular was issued to all officers and employes of the company. Distribution was effected through local offices and these offices also handled the subscriptions.

2nd. On July 24th a circular was sent out to all consumers. About 260,000 were mailed in sealed envelopes as first class matter. The circulars enclosed in envelopes were sent to the local offices where the addresses were placed upon them by means of the addressograph machines used in making out gas and electric bills.

3rd. On August 15, 1914, a second circular was sent to practically all consumers, but this time the distribution was effected in each district by means of collectors who delivered the circulars as they covered their routes in the performance of their ordinary duties. In some cases special messengers were employed. With this circular was enclosed a return post card giving the consumer an opportunity to indicate whether or not he had sufficient interest in the offering to justify sending someone to see him or to send him further information. Very few of the post cards were returned and this part of the plan was a failure.

4th. Just before mailing the post card to officers and employes a meeting was held in San Francisco attended by all heads of departments, district managers and all principal employes. At this meeting full information was given and everybody present encouraged to ask questions. A similar meeting was held at the time the first circular to consumers was mailed.

5th. Advertisements, which were changed from time to time, were inserted in the principal San Francisco papers and in practically all country papers in the districts served by the company. In this connection a good deal of excellent publicity was obtained in the news columns of these papers. This latter publicity was along legitimate lines as the plan was a novel one and naturally created a good deal of interest.

6th. The company managers and a good many employes solicited subscriptions. Outside of these a few men were sent

out from the head office, not over five or six at any one time, who worked on a commission basis of \$1.00 per share.

7th. In some of the smaller communities, and in several cities outside of the company's territory where they had no managers of their own, arrangements were made with local men, usually real estate and insurance brokers, to secure subscriptions on the basis of paying them \$1.00 per share. These local men were supplied with printed cards to place in their windows and on their counters. Similar cards were also placed in offices of the company.

8th. At the head office a so-called "Stock Sales Department" was established.

9th. Regular brokers were encouraged to handle the stock and were paid \$1.00 per share commission. The results were rather meager as the stock was not as a rule bought by brokers' clients, and after a few months the commission was withdrawn.

The foregoing explains fairly well the machinery of the campaign. Some general comment may, however, be of value.

The circulars to consumers, the newspaper advertising and the enthusiastic work of local managers and employes undoubtedly contributed to the success of the campaign more than anything else. The local agents and outside solicitors accomplished comparatively little directly but may have influenced some business to be brought to the head office for which they would not, in the nature of things, receive credit.

Cooperation With Banks

On the back of the first circular to consumers appeared a list of ninety-three banks, being the depositories of the company in the cities and towns in which it operates, who, by special arrangement with the company, acted as agents for receiving subscriptions and payments. This proved to be quite a convenience to subscribers and also resulted in quite a number of subscriptions being received through the direct efforts of the banks. Having this long list of banks on the circular, furthermore, gave tone to the offering and undoubtedly helped to impress many people. With one exception no compensation was paid to the banks for their services, although they were allowed one-tenth of one per cent on all payments handled. The money was also permitted to remain with them on deposit until needed by the Company.

Satisfactory Results

On June 3, 1914, just prior to the inauguration of the company's stock selling campaign, the total number of stockholders was 2,898, with average holdings per stockholder of \$14,530 par value. On December 31, 1918, the total number of stockholders was 8,242, with average holdings of \$7,160.

As a result of the campaign, the number of holders increased approximately two hundred per cent. This shows a wide distribution of the holders. At December 31st, 1918, 5,130 or 62% were residents of California, and 2,288 or more than one-fourth were women.

One of the most interesting features of the campaign was that comparatively little of the stock was taken by people accustomed to investing in securities. One evidence of this was the large amount of checks received, drawn on savings banks, and by the large number of people who paid coin, much of which undoubtedly had been hidden away in stockpiles.



Two views of the checks for Dividend No. 19 on first preferred 6% stock ready for mailing to 6,350 stockholders

Electricity in Local Products Week

BY CARL M. HEINTZ

(The various methods by which retailers keep in touch with local happenings were most effectively illustrated by electrical dealers of Los Angeles during "Home Products Week." Following is an account of one enterprising company's plan, by a member of the Los Angeles publicity department of the Westinghouse Electric & Manufacturing Company.—The Editor.)



This inviting display occupied one of the show windows of the Beacon Light Company of Los Angeles during the recent "Home Products Week" in that city. Light breakfast and lunch, electrically cooked were served here to the public throughout the week.

To stimulate the sale of locally manufactured products the city of Los Angeles recently staged a Home Products Week.

Practically all the merchants in Los Angeles, including the department stores, jewelry stores, etc., turned over the use of their show windows to the display of products manufactured locally. The electrical merchants took a very active lead in this work and a number of very attractive displays were installed.

The Beacon Light Company of Los Angeles, located in the heart of the shopping district, put on an extensive appliance campaign within their store.

One of their large show windows was arranged very attractively as a breakfast room, with locally

manufactured rugs and winter furniture. A quantity of locally made food products was secured from the various manufacturers, and light breakfast and luncheon were served to the public during the Home Products Week. Advertising space was taken in the paper and they advertised locally manufactured products electrically cooked.

All the food was cooked on a small toaster stove using a turnover toaster for the toast and an electrical percolator for the coffee.

Breakfast, which was served up to 11 o'clock, consisted of cereal, of different varieties, with cream and sugar, buttered toast, coffee and cream, griddle cakes and syrup, and bacon. For lunch, sausage or fried ham was served with buttered toast and coffee,

and cake made of local products cooked in an electric range was served for dessert.

The demonstration in the show window attracted the attention of the shoppers and a number of housewives went into the store and were invited into the breakfast room where the different electrical



The exceptional window displays devised by local electrical retailers were a feature of Home Products Week in Los Angeles. This is one of the windows of the Beacon Light and Gas Appliance Company.

labor-saving devices were demonstrated. The demonstrator showed the housewife how easily breakfast could be served at the breakfast table without even entering the kitchen.

A number of labor saving appliances were sold, and a host of new customers brought into the store.

THE DEEPEST WELLS IN THE WORLD

Named in order of depth, the four deepest wells in the world are the Lake, 7,579 feet; the Goff, 7,386; a well at Czuchow, Germany, 7,348; and the Geary, 7,248. The two deepest wells in the world are therefore the Lake and the Goff. The R. A. Geary well, of the People's Gas Company, is about 4 miles northwest of McDonald, Pa., and about 20 miles south of Pittsburgh. The mouth of the well is about 1,050 feet above sea level. The Goff well was drilled by the Hope Natural Gas Company on the farm of M. O. Goff, about 8 miles northeast of Clarksburg, in northern West Virginia. Its mouth is 1,164 feet above sea level. The well begins 200 feet below the level of the Pittsburgh coal and penetrates the usual oil-bearing and gas-bearing sands, the lowest being the Bayard, which lies at a depth of 2,210 feet. The strata in the remainder of the well are alternately "lime" and "slate." The J. H. Lake well, of the Hope Natural Gas Company, is about 8 miles southeast of Fairmont, W. Va. It is about 20 miles north of the Goff well and about 60 miles south of the Geary well. The mouth of the well is about 1,300 feet above sea level.

Western Ideas

AN OBJECT LESSON in mail-order principles was contrived by a California electrical dealer as a means of keeping trade from going to mail order houses. When he started to sell a certain make of electric iron, he sent for a \$5.50 mail order iron and, without even untying the string, set the package on the counter among the other irons. This is a specimen of the conversations which ensued when customers haggled over the prices of the standard irons:

"Why," asked one lady, "should I pay you \$7.00 for an iron when I can send east and get a Stands Anywhere iron for \$5.50?"

"Oh, you want the 'Stands Anywhere' iron, do you?" responded the dealer. "Well, I carry that, too. I'll be glad to sell it to you."

"Where is it? Let's have a look at it," answered the lady.

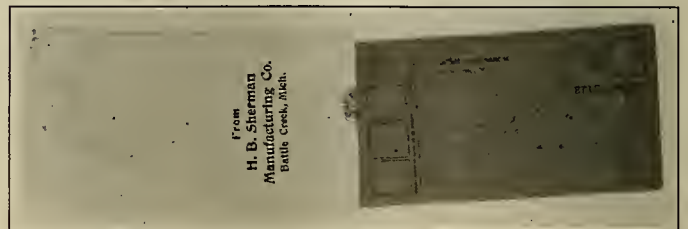
"It's right there in that box," said the dealer.

"Open it up. Let me see whether I want it or not."

"No," said the dealer. "It will stay in that box 'till it's sold. Isn't that exactly the way you buy from the mail order houses? Don't you pay your money before you ever open the box? I'll sell the iron to you on the same terms. That's fair, isn't it?"

The customer was convinced, and similar incidents have occurred many times. The box is still unopened, and the dealer has come to regard it as one of his most profitable investments.

A COMBINATION MAILING DEVICE which has many advantages is a small canvas bag with a strong brown paper envelope firmly attached to the closed end. Both envelope and bag bear the name of the company sending out the package, and the envelope has a space for affixing the parcel postage



A mailing device which combines a package and a letter and is a great convenience in ensuring their simultaneous arrival

as well as the usual right-hand-corner space for first class postage. The bag closes with a string at the top, and the envelope is sealed and addressed in the usual way.

For mailing small packages accompanied by a letter this device is a singularly happy thought. There are few people who have not been inconvenienced by the "under-separate-cover-we-are-mailing you" system. The letter with its encouraging promise arrives as first class mail, and is laid aside or filed against the time when the package shall put in an appearance. This may be the next day, but more often it is the next week. Then the letter has to be

disinterred and reunited with the package and the invoice. Frequently the package takes so long to follow the letter that an inquiry has to be sent out concerning it. Sometimes the package does not arrive at all—is lost on the way, or was never shipped. Where the package is not only mailed at the same time as the letter but is attached to it, as in the case of this combination device, matters are very much simplified for the recipient, as the affair only has to be handled once, the checking, filing and so forth being attended to all together and no further correspondence being necessary.

A SUCCESSFUL SELLING CAMPAIGN for sew motors, as carried out recently by a dealer, included several effective features.

The window display consisted of a sewing machine operated by a small boy. Cards were exhibited at intervals, some of them stating facts and figures about sew-motor economies and conveniences, others of a semi-humorous character emphasized the simplicity of operation by drawing attention to the obvious fact that a "mere man" could do it.

A section of the store was screened off and equipped as a sewing room. Here a capable woman operator was in charge, and housewives were invited to bring in their sewing to the demonstrator, and have it done the Sew Motor way. For those who could not come in, arrangements were made for displays in the home, and a special saleswoman with a good telephone voice was secured to take charge of this branch of the campaign.

A series of advertisements was designed, covering the whole week of the campaign and featuring the demonstrations.

The result of these devices was most successful, and a surprisingly large number of sales were made.

A MINIATURE NEWS SHEET instead of the usual advertising matter is the device of one elec-

trical dealer for drawing attention to his store. This news sheet is run in his advertising space in the local paper and is itself arranged to resemble a page of a newspaper. In it the dealer runs news items about the store; the people that work in it; the different new and old lines of electrical goods; interesting items about his customers and the people he wants as customers, and so forth. The current interest in an advertisement of this kind attracts attention and gives to a space which would otherwise contain merely a recurring advertisement, the status of a regular section of the paper to which people turn each evening for something new.

This form of advertising could be worked out from many new angles by the enterprising dealer. The personal element, of course, has greater possibilities in a small community, where everyone knows everyone else, but the news-sheet idea could be worked out in various other ways—as a series of timely cartoons, for instance, or chapters in a narrative. The great value of the notion, of course, is the fact that the same advertisement has a new interest every day and becomes, as it were, a "feature."

TIMELY ADVERTISING, when it depends on the weather, has to be prepared beforehand and held until wanted. The prompt umbrella and raincoat advertisements which appear in the newspapers almost simultaneously with the first shower are set up in advance by the newspaper and marked "Hold for Orders." When the rainy season arrives the order to publish is given, and the advertisements are inserted in the earliest possible edition.

This idea is almost exclusively employed by city stores, but there is no reason why it should not be adopted by small-town dealers, and applied to hot weather goods such as electric fans. Display cards and ideas for window arrangement should be held in readiness, and be promptly used to back up the newspaper advertising.



This attractive display corner is maintained by the Madera Electric Company of Madera, California. The general effect is that of a home interior showing the larger electric appliances, while in the foreground a careful, uncrowded arrangement of lamps and smaller appliances is enhanced by a judicious color scheme and good lighting.



California Electrical Co-operative Campaign

(The work of the California Electrical Cooperative Campaign continues to present interesting new developments in the way of merchandising ideas and practical results among contractor-dealers. The following notes from workers and committees are illustrative of the activity of the movement.—The Editor.)

THE MODERN SANDWICH MAN

BY W. H. BRAINERD

In his delivery car the electrical dealer has an up-to-date "sandwich man." The car is always on the street and offers advertising possibilities that many dealers are quick to grasp.



The delivery wagon has great possibilities as an advertising medium, and successfully performs the function of the old-time sandwich man

Two good examples of this are shown in the accompanying pictures. The attractive car of the Western Gas & Electric Appliance Company constantly keeps its name before the people of Chico.

The body of H. W. Jacobs' car is painted a bright yellow and attracts considerable attention.

Mr. Jacobs also uses cloth banners on the sides of his car to tell the people of Santa Rosa of special offerings. Through the use of these banners he sold ten dozen irons in a very short time.

CONSIDERING THE CUSTOMER

The contractor and dealer in merchandising his electrical appliances must always keep in mind a selling fact that the sales manager of the department store or any other store catering to women's trade never forgets:

1. The sale is made to a woman, because the home and the articles that go into it come under her particular jurisdiction. The women are the ones whose interest, curiosity and desire for an article must be aroused by the merchant and to whom he must make the sale.

2. A man pays the bills, because the husband or father is the earning power of the family and holds the pocket book. He is the person whom the woman must talk into the purchase.

There are exceptions to this rule, but most women come within the general scope, and all have the same peculiarities in buying.

Masculine and Feminine Shopping Methods —

We point out this in the beginning because it states the dealer's merchandising problem and gives an insight into the difference in the shopping methods of a man and a woman. A man has the pocket book and usually goes direct to purchase what he wants and buys on the spot. The woman must go out shopping, look around thoroughly, see the article, know the price, and then go home to her husband with the arguments that will open his pocket book.

Suppose a woman has decided that she wants a coffee percolator: when she presents the subject to her husband he probably says:

"I have never found anything wrong with the coffee in the old coffee pot. It is good enough for me. I don't care what Mrs. Smith has. Your coffee has always been all right. That old coffee pot was good enough for my mother. You are never satisfied. You always want some new-fangled, expensive thing."

Suppose he does say that. Did you or your salesman give her any argument to combat that talk? Both of you could, because there are reasons why a percolator is better than the old-fashioned coffee pot and everybody should have one. You have an easier article to merchandise than a jeweler, because your articles are all useful.

A woman has more time for shopping than a man, who is usually busy during the hours a store is open, and as a result she looks around more. The fact that she is going to a certain store to purchase a certain article, does not keep her from looking at or inquiring about other articles that she will not purchase that day but may purchase later from that store or in other stores. A good merchant will make his sales force understand this. Salesmen and saleswomen are too prone to lose interest and patience or even become discourteous if they do not make a sale immediately. Many a prospective sale has been ruined by lack of interest on the part of the salesman, and many a prospective customer driven from the store forever by a discourteous remark, all because the salesman never thought about who pays the bill or had the foresight to look beyond that day's work. The whole subject comes down to this one point, that a woman comes to look before she buys.

The People Who Know —

In this connection, there is no more valuable acquaintance for a contractor-dealer to cultivate than the sales manager in a big department or furniture store. He is confronted with the same merchandising problem as you, and has spent more money, time and labor in catering to women shoppers whose husbands pay the bills.

There is no better person with whom to talk over the sales problem than your wife or mother; they are women and know the shopping problem. You can do no better piece of salesmanship than see that your home is equipped with the electrical conveniences you sell. Your wife is in a position to demonstrate them to her friends, who, once convinced of their value, will talk about your up-to-date home. News travels fast and women are interested in what other women have. You can make your home a salesman. By use you give notice to all that you have faith in what you sell. You have a talking point—"My wife uses this article and says—."

All is part of the game of interesting the woman who buys and opening the pocket book of the man who pays. If you will always remember those two and their relation to each other you can handle your customers intelligently and have the basis for the successful solution of your business problems.

NOTES FROM THE ADVISORY COMMITTEE REPORT

Contractors and Dealers Association Activity

Thirty-five new members were secured in the northern section for the State Association of Contractors and Dealers. The membership in San Francisco was increased 100 per cent; no reports are available from the southern section. This means that more than one-half of the contractors and dealers are now active in their association work as opposed to less than one-fourth when the California Electrical Cooperative Campaign opened.

Cooperative Old House Wiring Campaign

In Los Angeles a cooperative old house wiring campaign conducted by the Los Angeles Gas & Electric Corporation, the Bureau of Power & Light and the dealers and contractors of that city, resulted in the wiring of 200 old houses.

Development of the Contractors and Dealers

Each month finds the contractors and dealers more willing to take suggestions from the Advisory Committee through its field representatives, and quicker to act on these suggestions. While there is still room for great improvement, the Advisory Committee feels that it will come faster than in the past. Every contractor and dealer who has moved into a new location or rearranged his store and windows has found a marked increase in the sale of appliances which has more than offset his additional expense.

In Fresno every dealer has moved to a new location or completely remodeled his store, and all compare favorably with the best merchandising stores in that city.

MERCHANDISING METHODS

Determining factors in merchandising are listed as follows by a Cooperative Campaign worker:

1. To get the customer into the store—
 - (1) Location
 - (2) Solicitation
 - (3) Window displays
 - (4) Newspaper advertising
 - (5) Mailing lists
 - (6) Distribution of literature
 - (7) Store displays
2. To make the customer buy—
 - (1) Arrangement of store
 - (2) Display
 - (3) Cosy corner
 - (4) Telling the customer what he wants to know
 - (5) Courtesy to customer
3. To have him come again—
 - (1) Mailing list
 - (2) Literature
 - (3) Follow up



Scene in a commissary in one of the camps on the new Kerckhoff power project of the San Joaquin Light & Power Corporation, showing the attention that is being given to the welfare and comfort of the men. In the corner may be seen a Magnavox which produces the latest musical melodies for the delight of the workmen at their labors on the surrounding hills. The California State Accident Commission and the Commission for Housing and Immigration have made official inspections of the numerous camps on this project and both bodies are united in their reports that the camps are ideal in every respect and none finer are maintained anywhere.

Tree Telephony and Telegraphy

(Among the many interesting developments which have arisen in connection with radio telegraphy during the war period, the use of tree-antennae is one of the most remarkable. The following brief account is extracted from a paper by Major-General George O. Squier, Chief Signal Officer, United States Army. The paper was recently printed in the *Journal of the Franklin Institute*.—The Editor.)

In 1904 some experiments were conducted with a view to utilizing growing trees as antennae for radio telegraphy and proved, in a general way, the efficacy of using a direct metallic contact to certain trees (principally eucalyptus) to increase the audibility of radio signals.

Following is a quotation from the account of these experiments:

"It would seem that living vegetation may play a more important part in electrical phenomena than has been generally supposed. We have seen that living vegetable organisms absorb and conduct electromagnetic oscillations over a wide range of the electromagnetic spectrum, beginning with sunlight, whose electrical action in the plant cell is at present little understood, and extending to waves of identical character, but of immensely greater lengths, such as Hertzian radiation, telephonic waves, and oscillations of the ordinary low frequencies used in commercial electric transmission lines. Disruptive discharges between vegetable electrodes, and electrostatic effects between vegetable surfaces are easily produced."

War-Time Developments —

In connection with the organization and development of transatlantic radio reception which was carried out during the period of the war to provide against the possibility of the interruption of the submarine cable system, the Signal Corps established a chain of special receiving stations in different parts of the United States to copy and record enemy and allied radio messages from European stations for the information of our Army General Staff.

In the prosecution of this work, directions were given to test the efficiency of growing trees as receiving antennae in connection with this service, using the vastly superior technique and facilities now represented in the radio art as compared with the crude apparatus with which the discovery was made in 1904.

It was immediately discovered that with the sensitive amplifiers now in use it was possible to receive signals from the principal European stations by simply laying a small wire netting on the ground beneath the tree and connecting an insulated wire to a nail driven in the tree well within the outline of the tree top.

One of the best receiving arrangements is found to be an elevated tree earth-terminal in the upper part of the tree top, and an earth consisting practically of several short pieces of insulated wire sealed at the outer ends radiating out from a common center, and buried a few inches beneath the surface of the ground in the neighborhood of the tree.

It was soon found that a tree-antenna could be used efficiently as a multiple receiving set over widely different wave lengths, receiving either from separate terminals at the same or different heights of the tree or in series from the same terminal.

This same type of circuit was employed in an inverse manner for telephonic transmitting purposes, and although the experiments thus far have been

limited to short distances, it was found that 2-way telephonic communication was easily established with remarkably low values of transmitting antenna current.

The flexibility of this arrangement is very striking. The linking up of wire and wireless methods was found to be convenient and efficient. Radio telephonic messages from airplanes were readily received by the tree-antenna arrangement and transferred thence to the wire system of the City of Washington and finally received at any point desired.

Furthermore, telephonic transmission through the tree-antenna was received by another tree-antenna, and automatically returned to the sender on a wire system, thus making the complete circuit. Long distance reception on any wave length from all the larger European stations and from ships at sea was easily accomplished and traffic copied on a twenty-four-hour schedule by the regular enlisted operators of the Signal Corps.

Data on the electrical constants of tree-antennae have been obtained by Captain F. E. Pernot, Signal Corps, in charge of the Signal Corps radio research laboratory at the Bureau of Standards.

Potential Earth-Terminal —

We may regard the metallic electrode rigidly driven into the living organisms of a tree as a potential earth-terminal for the study of the potential distribution on the surface of the earth itself. This metallic terminal intimately connected to the earth itself and a part thereof, is subject to changes of potential representing the innumerable frequencies required by modern radio telephony and telegraphy as well as other disturbances which may occur on the surface of the earth or in the atmosphere.

We can select from this composite one or more of the different frequencies by tuned electrical loop circuits suitably connected to this electrode and study each in turn at will, just as color screens can select a particular component of white light. We may, indeed, by means of a highly insulated conductor bring this terminal directly to the laboratory and connect it immediately to the modern thermionic tube and amplify almost at will the particular effects we are studying.

The physicist and engineer, accustomed to deal with inanimate material, is here confronted with the employment of living vegetable organisms of growing trees. We may consider that trees have been pieces of electrical apparatus from their beginning and their manifold chains of living cells are absorbers, conductors, and radiators of the long electromagnetic waves as used in the radio art. For our present purposes we may consider, therefore, a growing tree as a highly organized piece of living earth to be used in the same manner as we now use the earth as a universal conductor for telephony and telegraphy.

The Nisqually Substation at Tacoma, Washington

(Some of the operating kinks which solve local difficulties, as they have been worked out in the Nisqually substation which supplies the city of Tacoma, Wash. The system is city operated, private companies being permitted to serve only large power installations. The following description of equipment and conditions gives a good idea of the operation of this interesting station. —The Editor.)

The supply of electric energy for the city of Tacoma, Washington, is unusually well provided for by the Nisqually Substation of the Department of Light and Water of that city. The station was designed to transform and distribute a capacity of 20,000 kilowatts. Three-phase, 60-cycle power is received over two transmission lines from the hydro-electric station at LeGrande, 36 miles distant, at 50,000 volts.

A tap is taken off the high tension line to supply Camp Lewis and also the pumping station for the city water supply. Current is distributed at 2300 volts, 4000-volts-Y, to the city for light and power. By agreement with the city, the private company operating therein is not allowed to furnish any light, or any power in units under 25 horsepower, within the city limits.

Increasing the Load

Though the station was originally designed for a capacity of 20,000 kilowatts, it usually carries a load of 24,000 kilowatts or over. The station is under the direction of F. S. Morrison, chief operator, who has under him one operator and an assistant for each of the three eight-hour shifts.

For regulating the voltage of the light and power feeders, there are installed 21 69-kva. single-phase Westinghouse automatic feeder regulators.

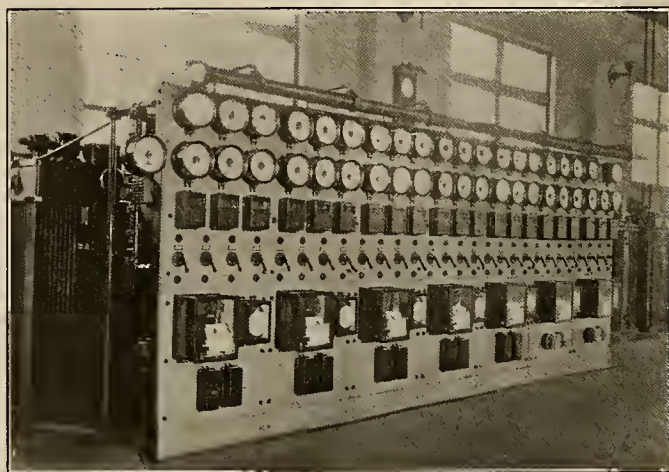
Switchboard Equipment

The switchboards for the control of the incoming lines, outgoing feeders, arc circuits, and auxil-

The switchboards, together with the lightning arresters, and oil circuit breakers on the high tension lines, transformer banks and feeder circuits, were furnished by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Standby Current —

Standby current for the operation of the remote-controlled circuit breakers and the pilot lamps is



Nisqually 7-panel Westinghouse switchboard installed, City of Tacoma, Washington, Nisqually Substation. The regulator just behind the switchboard is one of a bank of 21 Westinghouse 69-kva., single-phase, 60-cycle, 2300-volt, 10-20 per cent regulators, on light and power feeders.

furnished by a storage battery which floats on the line continuously. It contains 65 cells and is of the E-“11” type, supplied by the Electric Storage Battery Company.

Current for normal operation and for charging the battery is supplied by a motor-generator installed in the basement. The battery is kept floating on the line continuously, that is, it is never discharged except in an emergency, and charged just enough to equalize the cells once every two weeks; at other times the motor-generator carries the load and the battery floats.

The floating voltage of the battery is from 2.10 to 2.14 volts per cell, and in order to protect the graphic meters and pilot lamps, it was necessary to insert a resistance. The resistance originally used was a grid with a standard rheostat head which protected the devices, but did not allow enough current to pass to operate the oil circuit-breakers. In order to overcome this difficulty, counter cells were installed, some of which were built up out of old battery elements. These cells reduce the voltage, but at the same time permit a sufficient flow of current to operate the breakers. There are 12 counter cells divided into three groups of four each, with taps taken off so as to permit the cutting in or out of one or more groups as may be desired, and they are so connected that the current passes through them from positive to negative, continuously charging them.



2—3 60,000 volt, 300 amperes, Westinghouse oil circuit breakers on incoming lines, showing transformers in background. City of Tacoma, Nisqually Substation.

aries in the station, are built in sections, and mounted separately.

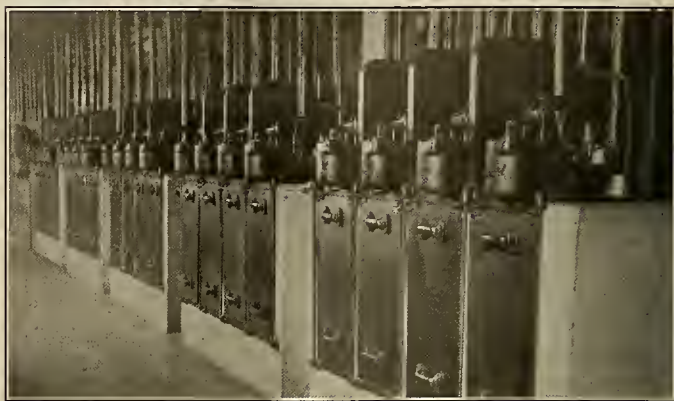
The boards are of blue Vermont marble surmounted by cornice work and are equipped with the usual complement of switching and measuring devices, making altogether a most attractive looking installation. Each outgoing feeder circuit is equipped with a graphic recording meter.

Operating Features —

The operation of the graphic meters and pilot and pilot lamps requires a continuous flow of about seven amperes through the counter cells, which causes a rapid evaporation of the water as well as the deterioration of positive plates. To overcome this, Superintendent Morrison has adopted the following scheme which has worked out most successfully: A 6.6-ampere series burning incandescent lamps is connected across each group of four cells. This shunts six amperes away from the cells, reducing the current flowing therein to from $\frac{1}{2}$ to $\frac{3}{4}$ of an ampere, and at the same time affords the benefit of the illumination given by the lamps which are located at certain points where it is needed. These locations are vital points, and in the event of the power going off at night, the illumination will be of the greatest assistance to the station operator.

In operating one of the circuit-breakers, the current momentarily reaches a value of seven amperes, thus subjecting the lamps to an over-rush of current. In order to correct this, Mr. Morrison expects to add three more cells, making a total of 15, divide them into three groups of five each, and install a short

piece of resistance wire in series with each lamp so as to hold down the current to six amperes. A snap



5 4,000-volt, 600-ampere, 4-pole, Westinghouse oil circuit breakers on light and power lines in foreground, and 2 type 16,500-volt, 600-ampere, 4-pole, oil circuit breakers in background.

switch is installed on each lamp so that when the battery is getting its equalizing charge, the lamp can be cut out, causing the counter cells to build up to their highest voltage at the time when it is most needed.

Mechanical Department of a Modern Bank

BY F. E. CHURCH

(The average depositor does not connect electricity with banking, but this glimpse behind the scenes of a modern bank will give some idea of the equipment necessary to maintain the smoothly-running machine with which we are all so familiar. The article, which is reprinted from the "Coast Banker," is by the chief engineer of the Guaranty Trust & Savings Bank of Los Angeles.—The Editor.)

The average patron of large banking institutions and, in fact, the employes themselves, do not generally understand the relationship and the importance of the mechanical and maintenance departments to their comfort and convenience, as well as



The relay system for the pneumatic tube carrier system. Tubes connect all departments, enabling papers to be sent from one department to another at the rate of fifty feet a second.

the efficiency of the bank's service. The abundance of cool, fresh air that greets the patron as he comes in off the street and invigorates employes during the hot, sultry summer months, is taken just as a matter of course. Ice cold water from sanitary drinking fountains, rapid elevator service from basement to mezzanine, the pneumatic tube carrier system which rushes checks and items for O. K.'s from one end of the bank to the other and back in a twinkling, the

bright, polished marble and brass and gilded trimmings, the fresh, clean blotters and check pads on the writing desks, and the general spic-and-span appearance of everything about the premises, all go to make up the subconscious impression which any patron is bound to have of "his bank"; but how many ever stop to think of the planning and equipment and labor that it takes to make all this possible, and to make sure that the subconscious impression is a good impression?

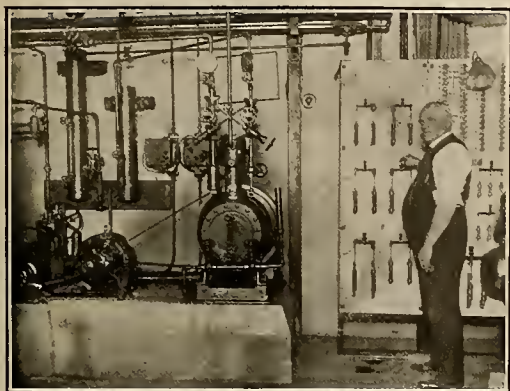
The management of the Guaranty Trust and Savings Bank gave a great deal of attention to these matters, and in building their banking quarters engaged the best architects and designers, that every facility might be provided to insure the utmost comfort for employes and patrons alike, and to give the most efficient service possible.

A Modern Air Laundry

Perhaps the most important item affecting the health and comfort of employes is pure air. To provide this, a very elaborate heating and ventilating system is installed. Pure air is drawn down a large shaft from above the dust and dirt of the street, at the rate of 40,000 cubic feet a minute. At the bottom of the shaft, the air passes through a close mesh screen over which water is constantly flowing, the effect being to thoroughly wash out any impurities the air may contain. A six-foot fan, driven by a 15 horsepower motor, forces the air through the plenum or distributing chamber, which has three

compartments—the cold air, hot room, and the heating element.

From the plenum chamber there radiate square ducts, of varying sizes for equal distribution of air, to all parts of the bank premises. Each duct is provided with dampers, one opening into the hot and the other into the cold air chamber. These dampers are



This two-ton capacity ice-making machine supplies fresh cold water at sanitary drinking fountains throughout the bank

connected to a thermostatic regulating system which operates to maintain any desired temperature in any part of the bank. The heating element of the plenum chamber contains steam coils with an area of 3000 square feet of heating surface. In the summer time these heating coils are filled with cold water to collect the humidity and cool the air.

But the job is not all done with pumping in an abundance of good air; so means are provided to remove the old air. A system of tunnels lies beneath the basement floor, with openings through registers into various parts of the bank. Through these registers and tunnels, a 15 horsepower Sturtevant fan exhausts the air from the banking quarters at the rate of 38,000 feet per minute. This remarkable "air laundry" provides a complete change of atmosphere within the bank every six minutes!

Running Ice-Water

Next to fresh air, in importance to health and comfort, comes pure, cool drinking water. This very essential element is supplied at convenient places throughout the bank in sanitary drinking fountains. The water comes through large filters in the basement of the building, and thence into insulated tanks in the bank's machinery room, where it is cooled by means of coils attached to a two-ton capacity ice machine, motor driven. A small triplex pump forces the cool water to the fountains.

Keeping Up Rapid Service

In a large departmental bank, with departments widely separated and on different floors, and having numerous transactions with one another, it is necessary for the best of service, to provide a means of rapid transmission of documents and checks to all parts of the bank. That the best possible service might be maintained, the Guaranty installed at great expense a pneumatic carrier system with twenty stations in the different departments, all connected through a central station at which an operator is on

duty. Thus communication between departments is carried on with the least possible delay.

The pneumatic system is operated by a suction blower, motor driven, having a capacity of ten cubic feet of air per revolution, and so arranged that the speed of the suction blower is governed by the number of tube stations in operation simultaneously.

Bank Elevators

Three elevators of the hydraulic plunger type come under the equipment and care of the mechanical department of the Guaranty Trust and Savings Bank. The passenger elevator operating between the safe deposit department in the basement, the general banking room on the main floor and the trust department on the mazzanine floor, is a most important part of the equipment from the standpoint of modern, efficient bank service. The proper attention to old and feeble patrons of a bank, and the growing tendency of all to demand a service in which everything is done for them, makes an elevator an almost indispensable part of up-to-date bank equipment.

The second elevator is called the coin lift, and is used to carry the "money busses" used by the tellers in the cages, to the coin vault in the basement and back. The third is for the use of the loan department to carry the large trucks containing mortgage papers to and from the vaults in the basement.

The elevators are operated by an automatically governed triplex pump, connected to two tanks. One is called the pressure tank, and from it the water is supplied to the elevators at a pressure of 125 pounds per square inch. The other is the "surge tank," and receives the water that is discharged from the elevator cylinders.

The flash messenger call system, the operation of the vault-door platforms and the intricate time-lock and burglar alarm protection to the vaults, and the maintenance of an elaborate indirect lighting system, as well as the proper upkeep of all furnishings and fixtures representing an investment of about \$400,000, all come under the responsibilities allotted to the mechanical department of the bank.

Safeguarding Waste-Paper

Even the waste-paper, which generally disappears into the waste-paper basket in most lines of business, receives a degree of attention at the Guaranty that would do justice to matters ordinarily considered of greater importance. The waste-paper from each department is put into a separate sack every night, and all the various sacks of waste-paper collected for the day are put into a steel bin. There are thirty such bins in a fire-proof room, and the waste-paper is thus stored for thirty days.

By thus sorting and storing the paper, any lost checks or other important papers may be easily traced. And at the end of the allotted thirty days, the paper is burned in an incinerator in the basement of the bank, so that no papers which may contain information of a confidential nature can inadvertently get outside the bank and fall into strangers' hands with possible damage to patrons or the bank.

A telo-autograph system is also part of the equipment installed for better service in the bank. By means of this mechanism, a teller, without leaving his window, can transmit to his bookkeeper any desired question about a patron's account, and have an answer back immediately; the whole operation being possible without the knowledge of the patron standing at the window, and thus avoiding possible embarrassment to him.

To cut down unnecessary noises, two sound-proof rooms were constructed to house the power check-canceling machines. In this way the canceling of thousands of checks, a very noisy operation, is carried on rapidly and quietly.

The employes of the Guaranty Bank are encouraged to make suggestions of improvements in equipment or methods of operation that will tend to expedite their work. These recommendations often involve changes in the equipment of a mechanical nature and are therefore turned over to the mechanical department to be worked out and installed.

The multitude of little things that can not be checked up or noted, that fall among the duties of the mechanical department of an institution with such elaborate and intricate equipment as that of an up-to-date departmental bank, requires machinery and personnel of an extent little guessed by the average bank patron.

How Prices Sell Goods

BY J. E. BULLARD

(The general psychology of price setting is here discussed in its relation to the type of business sought by the retailer. The effect of cut-prices upon the attitude of the customer, the need for convincing advertising to explain sale prices, and the varying methods of department stores and specialty stores are among the points taken up.—The Editor.)

As the result of a wager a man stood on the corner of a busy city street endeavoring to sell five-dollar gold pieces for one dollar. Even though he used every sales effort of which he was capable the day's sales was not great. The price was too low. People could not believe that any sane man would sell perfectly good five-dollar gold pieces for four dollars less than they were worth. Let your prices, or any business proposition you have to offer lack plausibility and you fail to make money.

Central Stations and the Sale of Appliances —

There was a time when many central station managers believed that a great many more electrical appliances could be sold, and that a very considerable increase in the consumption of electricity would result from selling appliances at cost price, or even less. There are probably a few central station managers who still hold this view. As a result of this idea central stations at one time, in certain sections of the country, sold electric flat irons for \$3.75 when dealers found it necessary to charge \$5.00 for the same iron. Even under such adverse conditions some dealers had the temerity to stock a few electric irons. People who compared the prices of the dealer with those of the central station could not understand why there should be such a difference. When the central station salesman explained that the company selling the electricity could afford to sell the irons for cost or less, the only plausible explanation was that the electric rates were so high as to result in an abnormally high profit to the company, and that the irons were sold so cheaply not to render real service to the public but to mulct them of a few more dollars.

When any public utility begins to sell appliances at a greatly reduced price, it is starting trouble for itself and for all others connected with the electrical industry—unless it can make the proposition seem perfectly plausible to the public. This it is rarely, if ever, possible to do, with the result that exces-

sively low prices for appliances do not over any great period of time secure the expected results.

The Department Store —

Possibly no other class of business men have given more thought to the problem of making prices sell goods than have department store men. It will be noted that all department store prices seem plausible. If the goods have a standard value of one dollar they are priced at 98 cents. It appears reasonable that a large store with great purchasing powers could sell dollar goods at a discount of two cents, and as two cents on every dollar is well worth saving, people swarm to the department store.

If a sale is made at a very great reduction in price it will be discovered that the advertising done for the sale gives a very plausible explanation of the low price. Perhaps a large stock of these goods has been purchased from some bankrupt concern. Perhaps it is the end of the season and the stock cannot be carried over to the next season on account of style or some other changes. In any case the explanation will be one that will satisfy the customers.

Exclusive Prices —

These are very important features to observe in setting prices on goods to be sold, and in the advertising of these goods. First of all, the prices must seem plausible. In certain lines of business there are specialty shops where admittedly high prices are charged. These are explained by the fact that high prices make better service possible, and the distinction attracts a certain class of trade even though the goods sold are of no better quality than similar goods sold at much less cost at department stores.

The dealer so situated that he can attract sufficient business from the very wealthy can combine with his business some sort of engineering service of a residence or domestic nature, and increase his prices far beyond those charged to the average trade. To do this, however, and make a real success of his venture, he will have to adopt many of the features

of the specialty shop, combine with it some special feature and not endeavor to secure any of the middle class business.

Cutting Prices —

Never place prices below the real value of the goods sold unless the most plausible reason can be given for doing so. The goods will be cheapened in the opinion of the customers and business will be lost rather than gained.

The safest plan to follow in regard to making prices help sell goods, is to sell them at the prices advertised by the manufacturers. If no prices are advertised, first be sure that the selling price fixed covers the cost of doing business. It is not well to pay too much attention to the prices charged by competitors. If you try to meet your competitors on prices, sooner or later you start a price-cutting war and in the end every one loses. Any great cut in prices, as has already been shown, rarely results in greatly increased sales. Unless the prices allow a reasonable margin of profit the business is doomed to failure.

If a dealer feels that the class of business to which he is catering requires a cut in prices, let those cuts be in odd cents and small rather than great. As a general rule all dealers will find that standard prices will sell more goods than cut prices. The least cut, in spite of everything that may go with it, never fails to create an atmosphere of cheapness and lack of quality.

A TELEPHONE EXCHANGE BY PARCEL POST

(Shipping a building through the mail is one way of constructing a telephone exchange where no railroads go. This interesting little account is extracted from an article in a recent number of the Western Electric News, to which publication acknowledgments are also due for the cuts used as illustrations.—The Editor.)

Roosevelt, Utah, is a town whose population numbers some 900 people, and is located in the



One of the transportation difficulties experienced in conveying material for the telephone exchange over the mountain trails to Roosevelt

Uintah Valley, surrounded by the towering peaks of the Rockies, isolated from all surrounding civilization by cliffs, hills and bad lands that the railroad has not been able to penetrate. To get to it you take the train to Price and then get aboard the stage

coach and travel 125 miles to Roosevelt. On that trip you go through mountain passes, swing perilously close to mountain ledges, slough through alkali-covered bad lands, and ford mountain streams whose waters threaten to carry coach, horses and passengers along with them. This is the way everything, including the mail, has to go to Roosevelt.

The telephone wire, that thin thread in the modern web of civilization, has penetrated into the moun-



The remains of a parcel post truck struck by lightning while on its way to Roosevelt to deliver equipment for the telephone exchange

tain fastness of Roosevelt—where even the railroad has not dared to tread.

In constructing its telephone exchange to Roosevelt, the Uintah Valley Telephone Company had to devise some way to get the material in—and chose parcel post. And so it happened that an entire telephone building, brick by brick, was shipped through the mail. The building is 25 by 32 feet and contains nearly 15,000 bricks. Each brick was wrapped in a piece of paper and ten bricks were packed in a crate. The postage amounted to \$825 or about 5½ cents a brick.

The telephone equipment left the Salt Lake office piecemeal, every bit of it parcel post. It is no uncommon thing to see on the Salt Lake shipping floor a number of crossarms, bearing postage stamps and the Roosevelt address. Desk stands, wire, insulators, etc., all go the way of the overland stage and parcel post.

The Uintah Telephone Company has over 500 miles of telephone lines, covering the entire Uintah Indian Reservation and continuing down through the state to the old "Cliff Dwellers" lands.

The transportation problem is a complex one due to road and climatic conditions. Automobiles, prairie wagons, sleds, and vehicular contrivances, so original no name can be found for them, come in for their share of the road work. In winter the snow and terrific cold make maintenance work a real job—in summer the severe electrical storms play havoc with the lines.

But in spite of the obstacles this little town in the fastness of the Rockies, so far from the beaten paths of civilization, has a telephone exchange and telephone equipment as modern and up-to-date as that of any city.

Water Power Rights on Government Land

BY W. B. HEROY

(The classification of lands in their relation to water power, and the various aspects of water-power development on government land are dealt with here in the second of a series of articles on water-power rights. The subject is of special interest at this time to the Northwest where large tracts of land are about to be thrown open to the public for various purposes. The author has been connected with the Land Classification Board, and the article is published by permission of the Director of the U. S. Geological Survey.—The Editor.)

The influence which the United States may exercise over the development of water power rests on its constitutional authority to control navigation, and on its ownership of public lands. Whereas the supervision of water-power development on navigable streams is usually recognized as being merely incidental to the improvement of navigation, the authority which may be exercised over the public lands is absolute, and the power regulating water-power development where public lands are affected is correspondingly great.

That particular tracts of public lands might have value for water power has long been recognized, for the early surveyors of the public lands were required to report all "mill seats" observed. The recognition of the fact that lands valuable in connection with power development should be removed from the ordinary course of disposition and specially administered, came, however, only after the realization of the special value of such lands consequent on the application of electricity as a means of power transmission. The first segregations within the public domain of lands valuable for power were made by Secretary Garfield. Under his direction the Reclamation Service selected certain power streams and recommended the withdrawal from disposition of bordering lands. Shortly after the beginning of the administration of Secretary Ballinger, he instructed the Geological Survey to "make investigation of water-power sites on the public domain, outside of national forests, which are not included in withdrawals for reclamation purposes, with the view to securing at the next session of Congress legislation to control and regulate their disposition."

Under these instructions the work of withdrawing lands valuable for power sites has continued up to the present time, subject, however, to the provisions of the act of June 25, 1910 (36 Stat., 847); Secs. 13 and 14 of the act of June 25, 1910 (36 Stat., 855); and the act of August 24, 1912, which give specific authority for withdrawals previously made under the general powers of supervision over the public lands vested in the Secretary of the Interior.

Selection of Power Sites

In carrying out these instructions the term "water-power site" has been interpreted to include any lands valuable in connection with power development. So rapidly has hydraulic engineering advanced that a diminishing proportion of the great hydro-electric plants of the United States are at points where nature has given unusual opportunities for power development by great concentration of fall. Natural water powers, water-falls and rapids, are generally the first to be utilized because the cost of construction is usually less per unit of power developed. After the water-falls in a region are har-

nessed, the demand for power makes profitable the development of less favorable sites. Then, as a last step, comes the creation of power sites on streams where, because of evenness of slope no marked opportunities for the development of power exist. Lands adjacent to such natural power sites as those at Snoqualmie Falls and at the Great Falls of Missouri are thus of great value, but it is no less true that lands along the Connecticut, the Tennessee, the Deschutes or the Colorado may have power value even though there may be no marked concentration of fall. The term "power site" is thus used in a broad rather than a restricted sense.

A water-power site, an opportunity for present or future power development, consists of two elements, flow and fall. The one element arises from the water itself, the other from the topography of the stream channel. Many rivers discharging large volumes of water are unsuited to water-power development because of the lack of slope. The Hudson below Albany and the Columbia below the Dalles are familiar examples. On the other hand, other streams have steep slopes and are topographically suited to the development of power but are deficient in quantity or distribution of discharge. The one element, flow, is a function of the water; the other, fall, is a function of the land over which the water flows. A power stream is thus one which by reason of the volume and regimen of its flow and of the slope and character of its valley affords opportunity for power development. The present feasibility of such development depends not only on these physical characteristics but also on economic conditions, such as cost of development and market. A water-power site is a particular portion of such a stream and its valley which is susceptible of development as a unit.

Where the gradient is steep, development may be of the high-head type, concentration of fall being effected by diversion of the water in a conduit. Where the gradient is gentle, dams are constructed to obtain the necessary head, the power house being placed at or near the dam, thus forming a low-head development. No clear line of demarcation can be drawn between these types and intermediate forms of development in great variety exist.

Determining Water-Power Value

The problem of determining what public lands have water-power value if the stream is suited to low-head development is relatively simple. The complete development of power in such places will depend primarily on the occurrence of suitable sites for the construction of dams of such height as to divide the stream into a succession of pools. A careful topographic survey of the stream and its immediate valley is first made. The hydraulic engineer using the topographic map as a basis, studies the

possible dam and power-house sites, the available data relative to the discharge and fluctuations of the stream, and the possibility of its improvement by storage reservoirs. A single scheme or alternative schemes of development are then worked out, providing for the greatest practicable ultimate utilization of the river, and the legal subdivisions of public lands which include areas necessary for flowage and power development works are withdrawn from disposition. Existing development works are taken into consideration in the formulation of such a comprehensive plan, and additional data are sometimes obtained from the surveys and water filing of power companies which own or control flowage rights.

Methods of Development

In the case of high-head developments, the problem increases in complexity, because of the variety of developments that become possible. Such a project will in general include a diversion dam, usually forming a small reservoir, a conduit conveying the water to a forebay reservoir, and pressure pipes conducting the water from the forebay to the power house. It is obvious that the location of structures of this character affords opportunity for wide variation, largely dependent perhaps on the ideas of the designing engineer. It is occasionally even difficult in preliminary studies of this kind to determine which side of a river affords the more economical conduit location, for the shortest line may be more than offset by difficulty of construction. There are, however, certain features which may serve to fix the limits of the section of a river to be included in one development. Thus the intake may be placed just below the mouth of an important tributary, not only to make use of the additional water it contributes but because a diversion at a higher point might necessitate carrying the water by flume or siphon across the tributary valley. Such a junction might also be the best site for a diversion dam, for flowage, and hence storage capacity, is obtained both on the main stream and the tributary. The portion of the stream to be included in one development depends largely on the slope and the length of conduits. The position of the power house is governed by such factors as the position of the intake of the next development downstream, by the length of pressure pipe required, and by the topography of the site itself.

Withdrawal of Public Lands

Until, therefore, actual construction is completed and the power of a high-head stream is harnessed it is seldom possible to state absolutely that certain tracts of land and those only will be utilized for power development. The alternative is to include in power withdrawals such lands as would be required for the location of structures under such other schemes as may appear feasible. Withdrawals of this type can scarcely be considered classifications in the sense in which the term is used with relation to agricultural and mineral lands, and as a rule no strict classification is possible. Under existing legislation however, this is the only means by which water-power sites of high-head type may be held in public ownership.

Withdrawals thus doubtless include lands that will never be actually utilized for power development. If, however, the withdrawals were made to include only one possible development and the lands necessary to other possible and perhaps equally feasible developments were allowed to pass into private ownership, the power site would have passed from federal control just as effectively as though all the lands had been restored.

Diversified Use of Land

This withdrawal of public lands as a safeguard against the alienation of the water power under existing law withholds the land from other forms of development. It is patent that a large portion of a forty-acre legal subdivision might be physically utilized for agriculture or mining without interference with a water-power conduit on the same tract. In other words, two uses of the same tract of land at the same time are possible. A parallel example is afforded where coal is mined under land at the same time that crops are raised on its surface. Such diversified use of the lands is to be encouraged as promoting the fullest possible development of our natural resources. In the situation which has arisen because of water-power withdrawals, it has been suggested that provision be made by act of Congress by which lands determined to have such power value may be patented with the reservation to the United States or its assigns of the exclusive right to use the land for power development, with payment to the patentee of actual damages incurred from such use. Such a reservation of water power rights would be similar to the reservation of the coal provided for in the act of June 22, 1910 (36 Stat., 583). Both the public lands water-power bills which were before the 64th Congress contained provisions of this character.

Classification of Public Domain

In accordance with the general principles above outlined about 1,800,000 acres have been drawn from the public domain because of water power value. The activities of the Survey have, however, not been confined to recommending withdrawals of lands valuable for power sites, but under the Secretary's instructions, large areas have been classified as without power value. Careful regional studies of the public-land States have been made and office maps have been prepared, or are in preparation, indicating areas within which no important power sites are known to exist. By the use of these maps the Geological Survey has reported to the General Land Office as without power value areas many times larger than the total area of lands withdrawn for this purpose. The elimination of the lands without power value and the retention of the lands which have power value thus become in effect a water-power classification of the public domain.

DETECTING SHIPS IN A FOG

A new discovery by Marconi provides a means whereby a ship in the densest fog may become aware of the approach of another ship. The apparatus also gives an approximate idea of the distance of the approaching ship.

Operating Difficulties

(An especially important feature of the forthcoming Pacific Coast A. I. E. E. Convention at Los Angeles September 18-20 will be the presentation of a number of brief practical papers from power men under the classification, "Symposium of Operating Difficulties." Vigorous efforts are being made to obtain these records of actual experience from as many sources as possible in order that the symposium may be broad, impersonal, and of real practical aid to the engineering profession as a whole. Following are two typical papers.—The Editor.)

STOPPAGE AND LEAKS IN TRANSFORMER COILS

BY JULIAN ADAMS

Assistant Electrical Supt., Pacific Electric Ry. Co., Los Angeles

In the substations of the Pacific Electric Railway system the transformers vary in size from 100-kva. to 1000-kva. and a large percentage of them are water cooled. With these substations scattered over a wide area, all sorts of water conditions are encountered. In localities where a large amount of solid matter is held in solution a great deal of trouble has been experienced with the transformer water coils becoming clogged with the solids deposited by the water on the interior of the coils. The presence of the deposit is indicated by a gradual decrease in the amount of water which will flow through the coils and as the amount of water is decreased the temperature is raised and the deposit of the solid matter becomes more rapid.

Cleaning Water Coils —

Our experience in cleaning these coils has indicated that the best method is to pump in a dilute solution of muriatic acid through them. For this purpose we make use of a 1½-inch all brass centrifugal pump. We start by pumping water through the coils and slowly add muriatic acid until a maximum strength of about 2 pints of acid to 10 gallons of water is used. It is often necessary to pump the acid through for several days before the coils are clean. If acid of the final strength mentioned is used to start with it is likely to result in stopping up the coils completely, and when this occurs it is sometimes impossible to clear the coils even with the use of high pressure. We had one case of this kind, and when the coils were cut open they were found to be solidly plugged with very dense iron oxide. In this case the water came from a deep well pump and examination showed that the pump casing in the well had been eaten away by electrolysis and the iron transferred to the interior of the transformer coils in the form of iron oxide. This of course was an unusual case.

Prevention of Leaks —

Some of the older transformer coils were made of very thin brass tubing and after some years of service these coils gave a great deal of trouble due to leaks produced by local galvanic action set up through impure water by the dissimilar metals composing the brass. In a few cases leaks developed in these coils which allowed sufficient water to get into the transformer, before it was detected, to short the transformer windings. In more recent years copper has replaced brass for transformer coils and heavier tubing used, making more durable coils. While iron coils seem to be meeting with some favor, they are open to the objection that iron has much

lower heat conductivity than copper, thus requiring greater coil area and weight for equal cooling effect and also a greater labor cost, which is hardly offset by the difference in the price of metals. A further objection to the use of iron lies in the fact that it is subject to more rapid corrosion than copper.

It is of course apparent that much of the trouble that developed with transformer water coils, both as to their becoming clogged and as to their leaking, could be avoided by the use of an effective purifying system for the water, but where a large number of substations are involved, as well as a large number of different kinds of water, the cost of an effective purifying system of water is considerable.

In the case of new installations the simplest and cheapest means of avoiding trouble with transformer water coils is not to use them. In sizes up to 1000-kva. self-cooled transformers now cost little if any more than water cooled transformers and when the cost of installing and maintaining a cooling water circulating system in connection with water cooled transformers is considered, together with the other costs incident thereto, it is my opinion that the use of water cooled transformers is undesirable even in sizes much larger than 1000-kva.

PUNCTURE OF SUSPENSION INSULATORS

BY CLEM A. COPELAND

Technical Assistant, Bureau of Light and Power, Los Angeles

The trouble dealt with here occurred on a 110,000-volt, 3-phase, 50-cycle line with neutral of transformers grounded at both ends, and two vertical circuits of 300,000 c.m. 19 strand copper cable steel towers 44.13 mi., with no branches, at a point 29 miles from San Francisquito Power Plant No. 1 on the summit of the Newhall Hills, at an altitude of 2350 feet. The weather was foggy and wet but calm. The temperature was about 55° F.

Nature of Trouble —

The single suspension middle cross-arm string on the east circuit of 7 insulators failed by the 6 lower insulators puncturing between pin and cap forming a crater from ½ to ¾-inch in diameter, all craters being approximately in the same vertical plane at right angles to line direction on the leeward side of the string away from the tower. The tower is at a sharp vertical angle, therefore the strain is great. The 6 lower insulators which failed were manufactured in 1912, but were not put in service until February, 1917. The top insulator was made in 1915 and put in service in February, 1916.

On the same tower on July 17, 1919, the top strings on the same circuit failed in a similar manner, at 4:30 a.m. during a heavy wet fog. On April 1 and on July 19 the same trouble happened on single dead-end strain strings of two of the same kind of

insulators on No. 2 solid wire, 33,000-volt lines in Los Angeles.

Cause —

The cause of the trouble is obscure, but several theories have been advanced:

- (a) Sharp ridged corrugation on pin form rings of high electrostatic density and strain.
- (b) Unyielding cement between metal of one coefficient, in conjunction with
- (c) Heavy strain due to vertical angles in line.
(c) does not seem to be borne out in the case of 33,000-volt lines.)
- (d) Flat top of insulator under cap and flat top of pin cavity may be of a form to introduce shrinkage strains in cooling.

The remedy is implied in the above analysis of causes.

THE ORIGIN OF THE PELTON WATER WHEEL

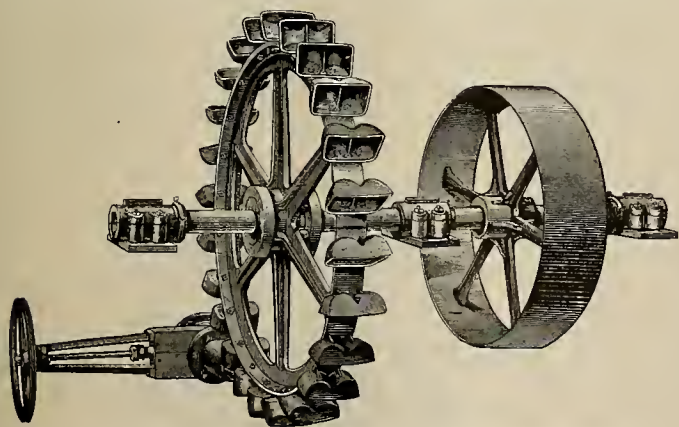
BY CHAS. H. TALLANT

(The term "Pelton Water Wheel" is so familiar as designating a standard impulse wheel that in using it as a classification we almost forget the origin of the name. The following interesting account of its beginning and characteristics introduces us to the inventor and gives the early history of his now world-famous wheel.—The Editor.)

No invention which has been developed to world importance in the states west of the Rockies has a more interesting history than the Pelton water wheel.

A Chance Discovery —

The Pelton water wheel, now designated in the larger sizes as impulse turbines, was invented by Lester A. Pelton, a miner and mechanical engineer, in the late 'seventies in the mining district of California. One summer young Pelton was employed to tend a "hurdy gurdy" wheel, the type of wheel which was then popular in the mining districts. This was a very inefficient wheel of the so-called "butterfly" type, with buckets of single curvature, and Pelton



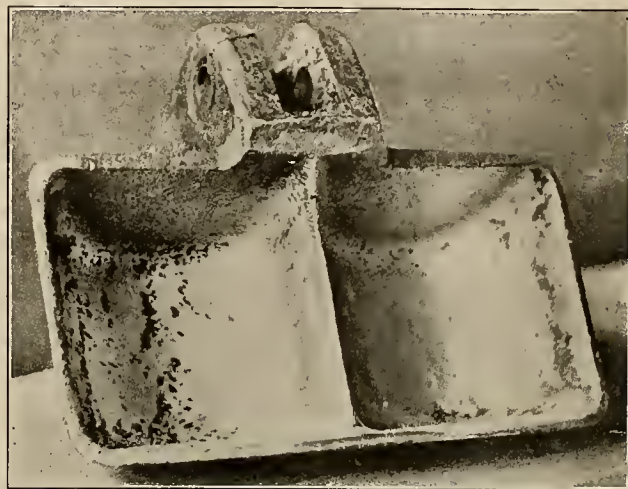
A very early type of Pelton water wheel. Before the incorporation of the company Mr. Pelton specialized on this one model, manufacturing it in six different sizes.

speculated on the possibility of improving its efficiency. One day an obstruction in the water line diverted the jet to one side and caused the water to strike the buckets' surfaces obliquely. An immediate increase in speed resulted, and this gave young Pelton the idea which later resulted in the improved Pelton wheel.

The First Experiments —

The following winter he was forced by heavy snows to spend the winter at a small mining town,

Camptonville, occupying a room in a village hotel. The water for the hotel came from a hillside stream and afforded Pelton the opportunity to experiment, though during the day other users limited the supply and forced him to make use of the stream at night. All through the winter he spent his nights in experimentation, trying various shapes of buckets and nozzle arrangements.



Lester Pelton was the first to discover the advantages of the divided bucket. This view shows the bucket he designed with a ridge in the middle.

The buckets, which he shaped by hand from tin cans, were fastened to the rim of a small wheel. His nozzles were constructed in the same way. After many trials he finally evolved the shape of the bucket which was later to bear his name and developed a fairly efficient nozzle.

Preliminary Tests —

The success of the model wheel was so marked that he began the construction of a larger and heavier unit, and by spring had completed a set of bucket patterns. These were patterns of divided buckets, to be of cast iron and belted to the rim of a standard pulley. The patterns were taken to Nevada City, where the buckets were cast, and the wheel was constructed in Allen's machine shop in that town. It was then transported to Grass Valley, where tests were run at the Idaho Mine. A head of approximately 225 feet was available and the wheel developed an efficiency of about 70%. This was considerably greater than the efficiency of any other wheel then in use in the mining districts, and created much interest among the miners.

Later Developments —

Following the success of this crudely fashioned wheel, Pelton made a trip to the State University at Berkeley, where he arranged with Professor Hesse, professor of mechanical engineering, to design and build an impulse wheel in accordance with his own discoveries and the then known laws of hydraulics. Professor Hesse and the four students of his senior class undertook this work and constructed a model wheel about 12 inches in diameter, for which Pelton paid them \$500. The tests run on this wheel demonstrated without a doubt that Pelton's ideas were sound and that he had opened the way to limitless opportunities for water power utilization. The model

wheel is still preserved as a valuable exhibit in the engineering college at the University.

From such an obscure beginning, the Pelton wheel has come to be known the world over, as designating the impulse type. The aggregate capacity of this type of wheel now in operation is something greater than 2,000,000 hp.

Formation of the Company —

Patents on the invention were not applied for by

young Pelton for several years, and other experimenters did considerable work along the lines of improving existing wheels; but his application was the first to be recorded for an impulse wheel using divided buckets. Some time later the financing of a company for the production of Pelton wheels was carried through by a group of San Francisco men, led by A. P. Brayton. The company was organized as the Pelton Water Wheel Company and was the forerunner of the present corporation of that name.

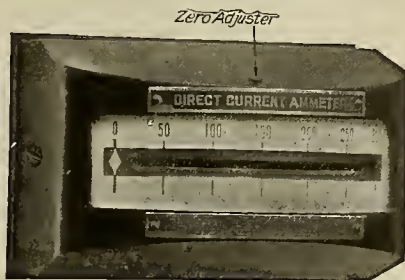
PRACTICAL LESSONS IN ELECTRICITY

BY H. H. BLISS

(Types of meters, their construction and capacity, and their application to varying currents are discussed in this article on current-measuring instruments. This is the twelfth paper of the series which is being published in connection with the Extension Division of the Universities of California and Oregon. Additional material for the course is supplied by the Universities.—The Editor.)

METERS

Direct Current Instruments. — Practically all electrical meters operate by reason of the production of magnetic fields by electric currents. The earliest indicating instrument was merely a single wire held above a compass needle. A flow of electricity in the wire caused the needle to turn through an angle dependent upon the strength of the current. Running the wire below the needle doubled the turning



Edgewise Ammeter. This instrument is used on station switchboards for metering direct current.

movement and it was a short step to the simple galvanometer which consisted of a compass mounted in a coil of wire with the needle perpendicular to the axis of the coil.

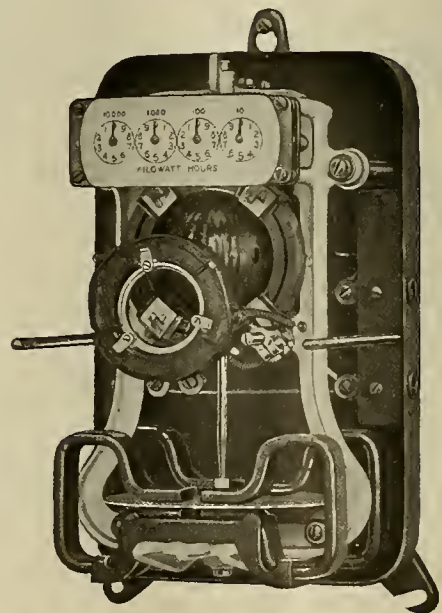
There are serious disadvantages connected with the use of the "moving needle" type of instrument, and these are eliminated in the "moving coil" and "magnetic vane" meters now commonly used. The moving coil meter of the D'Arsonval type has a coil like the armature winding of a motor, and this is placed in a magnetic field. When current (which is led into and out of the coil through spiral springs around the shaft) flows through the winding, the armature turns for the same reason that a motor revolves, but the springs restrain the motion so that the attached pointer moves only a limited distance. The torque depends upon the armature current, and hence the pointer indicates upon its scale a reading proportional to the current.

In instruments of this type every motion of the

coil causes the metal bobbin upon which it is wound to move through a strong magnetic field. This induces eddy currents in the metal, the effect of which is to slow the motion and prevent vibration of the coil after the needle reaches the point where the reading should be made. Such instruments are called "dead beat." Other meters do not depend upon eddy current "damping" but contain air chambers in which move vanes which stop the motion by air friction.

Light moving coils with delicate springs can not carry heavy currents, and ammeters of this type usually contain "shunts" which carry a definite fraction of the total amperes in multiple with the coil. The scale of the instrument is marked or "calibrated" to indicate the total current flowing in the coil and shunt.

A "milliammeter" or "mil-ammeter" is adapted to measure small currents and marked in thousandths of an ampere. Suppose the coil of such an instrument to have a resistance of 9 ohms and imag-



Interior of a direct current watt-hour meter. Which is the current coil? Can you explain the use of the disc and the permanent magnets?

ine a coil of 991 ohms connected in series with it inside the case. There would be a total of 1000 ohms between terminals, and if a pressure of 30 volts were applied, the current flow would be only 0.030 amperes or 30 mil-amperes. The scale reading would be 30, exactly equal to the voltage. A voltmeter, then, is simply a very sensitive galvanometer or ammeter with large resistance. Such an instrument is calibrated by connecting it in multiple with a standard voltmeter and altering the voltage by suitable steps.

If it is desired to use a 150-volt voltmeter on a 1200-volt circuit it is necessary to put more resist-



General Electric Wattmeter. Why are there more terminals than on a voltmeter? Is this instrument built for a switchboard or for occasional use?

ance in series with it. Manufacturers supply "multipliers" which are simply resistance coils to be used in this way. The meter reading must be multiplied by the appropriate factor to get the pressure.

Electrodynamometer Instruments.—Many moving coil ammeters and voltmeters have magnetic fields produced either by permanent magnets or by electro-magnets excited by a steady current. The "electro-dynamometer" ammeter or voltmeter, however, has a field coil connected in series with the moving coil, so that the torque depends upon the square of the current. The instruments contain no iron, and the reaction between the coils is spoken of as electro-dynamic, rather than electro-magnetic. The reading scale of such an instrument is not regular or uniform but the marks are much wider apart at some places than others.

The power in a d.c. circuit equals the product of volts times amperes, and it can be conveniently metered by an electro-dynamometer instrument. The moving coil (with high resistance) is connected across the line and takes a current proportional to the voltage. The stationary coil is put in series with the load and so carries the load current. The torque developed is proportional to the product of pressure and current and hence the scale may be calibrated in watts or kilowatts. The divisions may be very nearly uniform. Such a wattmeter may be used for high voltages by connecting a multiplier in series with the voltage coil, and for large currents with the help of shunts like ammeter shunts.

Metering Alternating Currents.—If the current is reversed in a moving needle instrument or in one having a moving coil and a permanent magnet, the pointer will be seen to deflect in the opposite direction. Such meters can not, then, be used on alternating current circuits. Electro-dynamometer instru-

ments, however, operate perfectly with alternating current, for the field of the stationary coil reverses as often as the current in the moving coil, thus producing torque always in the same direction. Hence electro-dynamometers are often used for a.c. circuits, as ammeters, voltmeters and wattmeters. They may be calibrated with direct current and used on either kind of circuit.

Various other meters have been developed for use with both direct and alternating current. The "electrostatic voltmeter" consists of moving and stationary vanes which are charged with static electricity by connecting to the opposite sides of a high potential circuit. The vanes are drawn toward each other, moving a pointer against the restraint of a spring. A fountain pen rubbed upon a coat sleeve will attract bits of paper by a similar electrostatic action.

A device used for both ammeters and voltmeters is the "hot wire." Current through a piece of resistance wire heats it, causing expansion which permits a spring to pull a pointer across a scale. Another scheme is to use for a voltmeter or ammeter a stationary coil surrounding two light parallel iron rods, one of which is fixed in position. The other is attached to the pointer and can move around the inside of the coil, always keeping parallel to the fixed rod. Both rods are magnetized when current flows, and the repulsion of like poles causes one to move away from the other. Still another device consists of a soft iron plunger which is sucked into a coil when current flows around it, the plunger being supported by the spindle which carries the pointer. Pocket instruments for testing dry cells are of this type. All these meters will work with more or less accuracy upon alternating as well as direct current circuits, for, obviously, reversing the current does not reverse the effect upon the pointer.

Many alternating current voltmeters, ammeters and wattmeters are of the "induction type." In



Multiplier to use in connection with a voltmeter or wattmeter. What resistance should it have to make a 9000-ohm voltmeter read 140 on a 560-volt circuit? What would the multiplier be called?

these a rotating field is produced, as in the induction motor, and this induces in the rotor short circuit currents which tend to turn it on its axis. A restraining spring and a pointer complete the moving element. Such instruments can, of course, only be used on a.c. circuits. An induction wattmeter has certain coils connected across the line and others in series with the load; ammeters and voltmeters have all their coils in series.

Watthour Meters.—Instruments for measuring energy consumption are often mistakenly called "wattmeters." A watthour meter is a small electric

motor so constructed as to use up very little energy and yet to run at a high speed proportional at all times to the power taken by the electrical load on the line. By means of a revolution counter a record is made on the dial of the number of revolutions of the armature, thus accounting for the kw-hr. that have passed the meter. Many d.c. watt-hour meters have commutators and brushes, the armatures being of high resistance and connected

for such service. These are simply induction motors, lacking commutator and brushes, and thus having no moving contacts.

It is necessary in all watt-hour meters to restrain the motion of the armature or else even a light load would cause rapid rotation and high readings on the dials. Usually a disc of aluminum is attached to the armature shaft and arranged to rotate close to the poles of strong permanent magnets. Eddy currents are set up which hold back the disc with a force proportional to the speed, and the result is that the speed is made proportional to the driving torque of the armature. In induction watt-hour meters the retarding disc serves also as armature, the revolving field setting up in one part of it eddy currents which cause it to move, and the stationary magnets setting up in another place currents which retard it.

Curve Tracing Meters.—Many meters are in service which make graphical records or charts. The curve drawn by a recording voltmeter, for instance, tells the voltage at every instant during a period of twenty-four hours. New sheets are inserted daily and thus continuous record is kept, which at any future time may be called upon for information regarding pressure fluctuations, short circuits, etc. Station operators who fall asleep on the "graveyard watch" sometimes are thus betrayed by a record of voltage too high or too low during half an hour.

Such an instrument includes a meter with a pen mounted on its pointer, and a clock for moving a piece of paper uniformly past the point of the pen. The mechanism of the meter may be similar to that of an ordinary electrodynamic voltmeter or wattmeter, but with sufficient turns of wire to give strong forces to overcome pen friction, etc. Other recording instruments make use of relays so that the pen is moved by electromagnets operating when the metering mechanism closes certain contacts.

Testing meters taken from residences in Fresno, California. Are these watt-meters or energy meters?



across the line so as to carry current proportional to line voltage. The field is then connected in series with the load. Such meters have no iron at all in the magnetic circuit, which means that the flux and torque are proportional to the voltage and current and no complications are caused by variations in permeability, etc.

Reversing the current in both the armature and series coils of such a meter gives torque in the previous direction, and hence it may be used on a.c. circuits. For several reasons, however, watt-hour meters of the induction type are generally preferred

The Business Library

BY LOUISE B. KRAUSE

(Librarians are born as well as made. The contributory elements in the make-up of a successful business librarian are here analyzed and discussed in the last article of this series on the business library by the librarian of H. M. Bylesby & Company.—The Editor.)

THE ESSENTIAL QUALIFICATIONS OF THE BUSINESS LIBRARIAN

Thoughtful consideration of what the business library does will inevitably lead to one conclusion, namely, that the librarian, who is the director and inspiration of the work, must have greater educational qualifications than can be found in the average office employe who is engaged either in the capacity of stenographer or file clerk. The qualifications which are necessary to make a successful business librarian may be definitely stated as follows:

1. A college education or its equivalent.
2. A library school education or its equivalent.
3. Certain innate mental and social traits.
4. The business man's point of view.

1. A College Education or Its Equivalent

The business librarian, no matter how well educated, will never have a superabundance of knowl-

edge for the prosecution of the task, for the ramifications of business subjects are innumerable and touch the sum total of human knowledge; and while no one person can be master of all subjects, yet a college education, and the mental training which it implies, should give not only a wider knowledge, but a power of adaptability and versatility in working with information, which constitute an indispensable asset in the prosecution of business library work.

The type of college graduate who makes the best business librarian is the one who is able to exercise a high degree of concentration, think clearly and quickly, analyze subjects, understand cause and effects, make logical deductions and wise discriminations, express ideas clearly and to the point, and be able to discuss intelligently the information which he passes along to the business man.

It is only just to state at this point that some college graduates do not measure up to the standards which have been indicated, and that there are many well-educated men and women without college degrees who do; every man or woman must be judged on the basis of individual merit. A business organization, however, can make no more serious mistake than to think it can put its library work into the hands of some one of limited education, who, although he knows the work of the particular business by long apprenticeship, has not the important requisite of a larger point of view which is the result of a broad education, no matter by what means obtained.

W. H. Cameron, when general manager of the National Safety Council, writing of library work as an aid to that organization, stated the facts exactly when he said: "The problem of the industry, the application of the library's information, the method of presentation and the utility of the service, all require trained minds."

2. A Library School Education or Its Equivalent

A liberal education, however, is not sufficient in itself to make a business librarian, unless that education has included the second requisite in the list of qualifications, namely, education in approved methods of library science, according to the standards taught by accredited library schools.

What is meant by library science, and why is it necessary that a business librarian should be trained in it, in order to do adequately the work of the business library? Library science is the standardization of the most approved methods of doing library work, based on the results of many years of study and practical experiment by librarians of large ability who have given their full time and energies to the task. In brief, methods of library work have been standardized by library experts and reduced to a practical, economical, effective science.

If this be the case, what possible justification can be found for business firms who waste time and money, in addition to getting no adequate results, in devising original methods for doing their library work? Trade periodicals, for several years, have published a number of articles treating of original methods adopted by various firms for filing and indexing their printed information. These original schemes reveal many weaknesses and discrepancies and also that many business men are entirely ignorant of the fact that library science has already produced much more excellent ways of working. No man is competent to work with any principle of science, much less modify it, until he is first master of it.

The structure of the business library must be built on the solid foundation of established library science, and there is no fact which business men need to realize more, than that library science as taught in professional library schools is not a simple code summed up in a few text books to be readily mastered by a novice and improved upon at will, but, on the contrary, that it covers a wide range of material, and must be studied by the use of many books devoted to classification, cataloging, reference work

and other related subjects. True, there are primers of library science, but as well give a novice a primer on the steam engine and expect him therefore to be adequately equipped to run a power plant, as to put a novice with a library primer in charge of a business library with its highly specialized needs. A business organization would not think of engaging either a stenographer or a bookkeeper who is not trained to do his particular work; how much more, therefore, should a business librarian measure up to recognized standards of library training in order to perform adequately the difficult and important work which he is called upon to do.

The argument for the employment of a trained librarian can be briefly summed up in five words: the trained librarian knows how.

The trained librarian knows how to get and how to use sources of general information, how to keep up with the latest data on business subjects, how to use quickly and accurately the facilities of large city libraries, how to use all kinds of printed indexes, how to classify, catalog, and index material according to standard practice, so that no time or money is wasted in experimenting with inadequate systems, and last but not least, knows how to have a place for everything and everything in its place, so that desired information is immediately available.

As has been intimated, some college graduates cannot grade up to business library requirements, so also, some library school graduates are not suited for business library work, and rarely is a library school graduate, who has not been seasoned first by some thorough library experience, before coming into business library work, fitted for the task. Some trained librarians get so obsessed with the red tape and detail of their library training that they never dare to be original in modifying and adapting their fundamental library principles to new conditions and business problems, and therefore cannot create the type of service which is essential for business.

Some of the advocates of business libraries, having seen library trained people who have "fallen down on the job," speak slightly of library training, and go to the other extreme, saying that the successful business librarian is born and not made. This is not true, because no innate qualification ever carries with it the ability to succeed in the absence of the proper training. "Both the heritage and the training of the faculties must go hand in hand to insure success." Trained librarians should be estimated by business men in the same manner as they estimate other skilled workers. When an engineer, or in fact any professional man, fails on a piece of work, his employers do not condemn engineering or professional schools as a whole, but try another trained man on the job. If a business man has made a wrong estimate in selecting his librarian, he should not quarrel with library training, but get a higher grade librarian.

The failure of some business librarians who have had both college education and training in library science is due not to inadequate knowledge but to lack of personal qualifications, and while personal qualifications alone will not make a successful

business librarian, neither will a college education and training in library science make a successful business librarian without certain innate mental and social traits.

3. Mental and Social Traits

The mental and social traits required for success in any line of business work apply with equal force to the business librarian, and it is not necessary to enter into any academic discussion of them at this time. Everyone knows that good health, accuracy, thoroughness, common sense, good judgment, tact, integrity of character, and memory (particularly in library work) are indispensable to success in any career, but there are certain traits which a long term of service in a business library and an intimate acquaintance with many business librarians have made clear to the writer, as necessary to success in the business of being a business librarian.

The business librarian must be an executive; he must have not only a balanced view of every detail of library work in relation to its particular whole, but he must especially have an adequate vision of library work in relation to the whole work of his organization, and he must have the ability to see this relationship without waiting for some one to point it out to him. Finally, he must be able to relate the particular business and its existing service, to the work of the world at large.

A librarian serving a prominent business organization was recently asked by the writer, what was the scope of the work of their publicity department in furthering the interests of the organization as a whole, with the result that she could not tell. This librarian only knew that her business was to catalog, classify, put away and be able to get out again the material which was assigned to her care. The executive head of another important business organization has often complained because his librarian was afraid to take any initiative and always waited to be told what detailed policy should be pursued by the library; he was too busy to have to carry it on his mind, and more than that, he really did not know, and needed a librarian who did.

The business librarian must see the need, make the plan, and get all the mechanism necessary for its accomplishment into thorough working order, and have backbone enough to hold the point and have power to make others see it. There is no place in a business library for the mere "bookkeeping" methods, of a recorded and finished job, for the work of the business library is never finished; it is a living force, and like all living things, it is subject to constant change and progress and never gets to the finished stage which suggests the orderly quiet calm of a grave yard!

What the business man wants from his librarian is results, and it is the business of the librarian to know the best way of getting them. The well qualified librarian can give results abundantly, if the business man will delegate authority to act independently in matters of detail, conferring on his librarian as he should, the freedom of action which he gives to the well qualified head of any department, and trusting his librarian to come to him for a conference

when the occasion demands. There is no greater handicap to a well qualified librarian than the type of business man who does not delegate authority, and who because of his success in other lines of business, attempts to guide his librarian in matters of library policy about which he knows absolutely nothing.

The business librarian must be unusually resourceful and know how to meet an urgent need for information with quick decision and immediate action. He never says "impossible" until he has tried every possible source of supply.

Probably one of the finest compliments ever paid a business librarian was given by the executive head of a large institution who, having seen the resourcefulness of a certain business librarian in several difficult situations, remarked, "I am confident that if a twenty-story building fell down on Miss B——, she would find a way to get out from under it," and he might also have added truthfully, "and she would also keep a spirit of enthusiasm in the venture," for to the true business librarian the fascination in the game of finding things never wears out.

The business librarian will not be punctilious about adhering to a time schedule for work or to any standard of rights or privileges; he will put the demand of his work first and his personal interests second. If it is necessary to break an important personal engagement made for his free time, because business of importance has arisen in the office, he will do so without any question or irritation. If he can best serve the company in an urgent need, he will not wait to be waited upon by an office boy, but will go himself rather than trust a boy who cannot be relied upon to hurry. The business librarian will not be old-maidish or fussy over any irregular demands which upset his routine work; there is no place in business for the trained librarian who tells a busy man of affairs he cannot have what he wants until certain regular routine has been carried out, and in return the business man should trust his librarian with a freedom of action which is not subject to a time clock or a time schedule.

The business librarian must be able to work harmoniously with "all sorts and conditions of men," and he must convince every one whom the business library serves of honest good-will and impartiality to all, and genuine loyalty to the organization which he serves. He will be discreet and will not gossip about company business on the aside in the office, or on the outside, and last but not least, he ought to have a saving sense of humor. These qualifications may seem exceedingly trite, but the lack of them has been a severe handicap and a glaring defect in many people filling different kinds of business positions.

The successful business man knows the value and power of acquaintance as a business asset, and the business librarian must maintain a wide acquaintance and friendly relationships with other library and business workers, both for practical help and general stimulation. It is a real part of the work of a business librarian to take time to cultivate these outside relationships and attend library conferences,

at the expense of the business organization by which he is employed. The importance of these outside relationships has been noted in the first chapter, as helpful ways of getting information not in print.

The business man who keeps his librarian's nose on the grindstone of routine work, so that he never has an opportunity for outside fellowship and the stimulation that comes from it, soon loses more than he gains by such a policy.

4. The Business Man's Point of View

The business librarian must also have a genuine and intelligent interest in current political and economic events, and in the kind of information in which business men as a class are interested. He must know the contents of the daily newspaper as well as does the closest reader among business men, so that he will not do as one librarian did—endeavor to give an inquirer an item three weeks old when the latest news on the subject was in the yesterday morning's paper, or waste time looking up statistics on a South American town, which current news reports as having recently burnt down. He must be a constant and thoughtful reader on subjects which pertain to the business of his organization.

The business librarian must have the promoter spirit; he must see that the information which he has on hand is applied and working, and he must be alert enough to see in some measure the undeveloped sides of an industry, and endeavor to bring into the organization, information which may stimulate it to new activities.

To sum up all requirements for a successful librarian: he (or she, as the case may be) must have a liberal education, plus a knowledge of library science, and a sympathetic understanding of business needs, together with the vision and personal power necessary to apply the field of print effectively in meeting these needs.

In conclusion, the business man must face fairly several facts, the chief of which is, that in only a limited number of cases have business libraries measured up to the standards which have been outlined in this handbook, because business firms have not engaged librarians who have the necessary qualifications for success. Some business men have not recognized that there are librarians and librarians, and that many so-called ones are not adequately equipped for business library work. Business men are at fault also because they often do not give personal attention to the selection of a librarian, but leave this selection to an employment manager or a welfare worker who very often does not know just what essential qualifications are necessary for a position. Sometimes the business man does not want to pay the price for an efficient librarian, for no efficient librarian can be obtained for the average file clerk or stenographer salary. One high grade librarian will accomplish more work, both accurately and effectively, than two mediocre ones can possibly do, and is therefore a money-saver.

If there is any doubt in the business man's mind as to whether there is enough library work in his organization to keep a trained librarian continuously busy, it may be said, that in no instance which has

This article concludes Miss Krause's series on the business library. The entire series is now being revised and enlarged and will shortly appear in book form. A new series dealing with the service of the public library to the business man has been arranged to follow Miss Krause's articles in the pages of the Journal of Electricity.

come to the knowledge of the writer, has a trained librarian ever been employed by a business organization which has not found there was immediately developed a valuable library service which required the full time and energy of the librarian.

MEASURING THE FLOW OF FLUIDS ELECTRICALLY

BY JACOB M. SPITZGLASS

(The simplicity of the ammeter and watt-hour meter has led to the application of these devices to the measurement of fluid motion in pipes. The method described below was evolved after a series of experiments which were recounted in a paper read at the recent meeting of the American Society of Mechanical Engineers at Detroit. The following is an extract from the paper.—The Editor.)

Despite the fact that the science of mechanical engineering is much older than that of electrical engineering, its methods of measurement are nevertheless in many respects much behind those afforded by the latter. A striking example of this is found in a comparison of the methods of measuring fluid motion in pipes and the flow of an electric current. The instrument used for the electric current is simple and direct-reading, and while there have been many excellent devices adopted for measuring the flow of fluids in pipes, it has been quite generally agreed that an instrument similar to the ammeter or wattmeter would be of great value.

Recently a number of experiments have been made with a flow-measuring device in which these instruments are applied. Measurement is accomplished by means of an electric current which is so regulated by the differential pressure of the flow that it represents the amount of fluid passing through the pipe.

Principle of Operation —

The principle of the device involves a combination of the physical laws governing the flow of fluids in pipes and the flow of an electric current. The units of flow measurement are represented by general equations covering the relation between the velocity of the fluid in the pipe and the differential column obtained by the device. For the units of the electrical measurement, in the standard adopted the maximum capacity of flow is represented by a current of 1 ampere at a constant pressure of 40 volts.

The main features of the device are shown diagrammatically in the illustration. The U-tube, partly filled with mercury, is made to balance the impact pressure of the flow in the pipe by the rise of mercury in the low-pressure side of the tube. The

mercury column also forms a part of the electric circuit, as shown in the figure. This electric circuit contains a fixed external resistance R_1 in series with a variable internal resistance R_2 , a constant electromotive force E , an ammeter A and a watt-hour meter W . In the contact chamber C , which forms

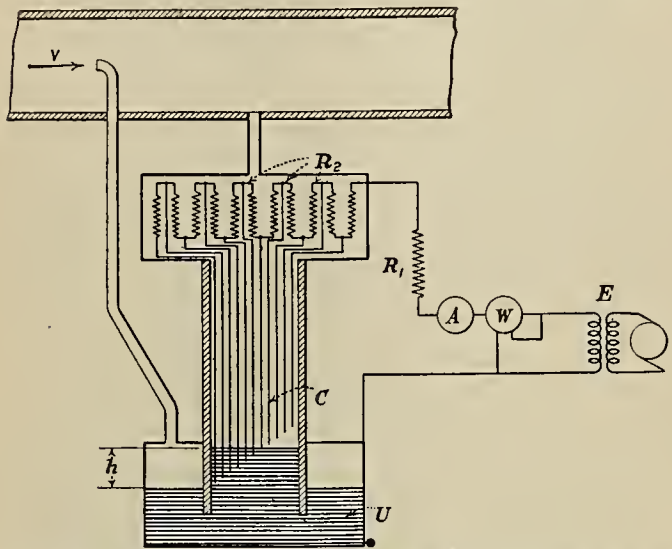


Diagram of electrical device for measuring the flow of fluids in pipes. The electric current is so regulated by the differential pressure of the flow that it represents the amount of fluid passing through the pipe.

the low-pressure side of the U-tube, there are a number of conductors of varying length placed above the mercury column, and as the mercury rises it makes contact with one conductor after another. The variable resistance R_1 is subdivided by these conductors into resistance steps corresponding to the varying length of the conductors, so that the rise and fall of the mercury column varies the amount of resistance and thereby regulates the amount of current passing through the circuit.

Practical Application —

The fact that the flow of fluids can be measured electrically has made possible many important installations where no other method could be employed. In one instance a large manufacturing concern had been contemplating for a long time the adoption of a system for measuring the amount of steam, air and water used by its various departments, but was hindered by the fact that the various lines were distributed over a wide area and in some places were carried through sub-basements, where measuring devices would be inaccessible; also much time and a large force of employes would be required to read the various instruments about the plant and to integrate the recording charts. As soon as the concern discovered that flow could be measured electrically, that the indicating instruments did not have to be located where the flow was to be measured, and that the integrating device was merely a watt-hour meter which integrated the flow independently of the other instruments, a measuring system was instituted for all its products and many wasteful uses of power were thereby eliminated and an accurate distribution of costs established throughout the factory.

When measuring the flow of steam generated by a battery of boilers the flow indicators are placed in

front of each boiler, showing the momentary performance for the guidance of the fireman. At the same time, supplementary recorders connected electrically with the indicators are placed conveniently for the supervision of the chief operator.

Recently the manufacturers of water gas adopted the use of low-pressure exhaust steam for gas generation, which created an urgent demand for a measuring device to operate intermittently, varying every few minutes from zero to maximum. After many unsatisfactory trials of mechanical devices the electrical method of flow measurement was adopted, as this made it possible to measure successfully the steam required for the manufacture of water gas and resulted in a great economy.

The main advantage, however, of the electrical method of flow measurement is the accuracy with which the differential pressure is transmitted through a mercury column, which column is not hindered in its movements by any mechanism and is therefore free to attain the true level under all conditions of flow. Furthermore, the electrical instruments used to register the flow can be checked at any time without interfering with the operation or installation of the measuring device.

MELTING POINTS OF CHEMICAL ELEMENTS

This table of melting points of the chemical elements has been issued by the Bureau of Standards in answer to numerous requests for this information.

As nearly as may be, all values, in particular the standard points, have been reduced to a common scale, the thermodynamic scale. At high temperatures some of the values are quite uncertain; thus, while the melting point of platinum may be considered accurately known to 10° C, that of tungsten is possibly uncertain by 50° C or more. Temperatures centigrade are rounded off, and the exact Fahrenheit equivalents are usually given.

MELTING POINTS OF THE CHEMICAL ELEMENTS					
Element	C	F	Element	C	F
Helium	<—271	<—456	Neodymium	840 ?	1544
Hydrogen	—259	—434	Arsenic	850	1562
Neon	—253 ?	—423	Barium	850	1562
Fluorine	—223	—369	Praseodymium	940	1724
Oxygen	—218	—360	Germanium	958	1756
Nitrogen	—210	—346	SILVER	960.5	1760.9
Argon	—188	—306	GOLD	1063.0	1945.5
Krypton	—169	—272	COPPER	1083.0	1981.4
Xenon	—140	—220	Manganese	1230	2246
Chlorine	—101.5	—150.7	Beryllium		
MERCURY	—38.87	—37.97	(Glucinum)	1280	2336
Bromine	— 7.3	+ 18.9	Samarium	1300-1400	2370-2550
Cæsium	+ 26	79	Scandium	?	.....
Gallium	30	86	Silicon	1420	2588
Rubidium	38	100	NICKEL	1452	2646
Phosphorus	44	111	Cobalt	1480	2696
Potassium	62.3	144.1	Yttrium	1490	2714
Sodium	97.5	207.5	IRON	1530	2786
Iodine	113.5	236.3	PALLADIUM	1549	2820
Sulphur	Si 112.8	235.0	Chromium	1615	2939
	Sn 119.2	246.6	Zirconium	1700 ?	3090
	Sm 106.8	224.2	Columbium		
Indium	155	311	(Niobium)	1700 ?	3090
Lithium	186	367	Thorium	>1700	>3090
Selenium	217-220	423-428	Vanadium	<Mo.	<Mo.
TIN	231.9	449.4	PLATINUM	1755	3191
Bismuth	271	520	Ytterbium	?	.....
Thallium	302	576	Titanium	1800	3272
CADMIUM	320.9	609.6	Uranium	<1850	<3360
LEAD	327.4	621.3	Rhodium	1950	3542
ZINC	419.4	786.9	Boron	2200-2500 ?	4000-4500
Tellurium	452	846	Iridium	2350 ?	4260
ANTIMONY	630.0	1166.0	Ruthenium	2450 ?	4440
Cerium	640	1184	Molybdenum	2550	4620
Magnesium	651	1204	Osmium	2700 ?	4890
ALUMINIUM	658.7	1217.7	Tantalum	2900	5260
Radium	700	1292	TUNGSTEN	3400	6162
Calcium	810	1490	Carbon	>3600	>6500
Lanthanum	810 ?	1490			
Strontium	>Ca<Ba ?	.....		

SPARKS—Current Facts, Figures and Fancy

(The latest in wireless telegraphy, profit-sharing, and the generation of electricity appears among these items garnered from the odd corners of the earth. Among other curious things worth knowing—or not, as you please,—are how to run a store in Mexico, how to hoard soap bubbles, and where to go for watermelons. If we told you the name of a certain city jail you would also know which was the most law-abiding town in America.—The Editor.)

Every man in Poland has to have his hair cut close, according to a recent edict, part of an anti-typhus campaign. We believe in hygiene of course—but how is anyone to tell a pianist from a prize-fighter?

* * *

A dog's life is very much so if the dog happens to be the solitary occupant of a city jail. Some presumably model American community reports that its only prisoner is a mongrel accused of appearing in public unaccompanied by a license tag.

* * *

Six-cent metal checks for street car fares are being inaugurated by the Georgia Railway and Power Company. They are of the nature of telephone slugs and are stamped with the Company's guarantee of six-cent value, good for one street car ride.

* * *

In Germany coal is taken from the mine without handling to stations where power is generated at half a cent per horsepower. This power is distributed electrically and not mechanically, which means a very much reduced cost in industries consuming large quantities of power.

* * *

A melon for every man, woman and child in America (—no, this is not a bonus offer) has been grown in Imperial Valley during the past year. Two and one-half million crates and 7,830 cars were required to move the crop; the gross returns totaled approximately \$9,208,080.

* * *

A good picture of a donkey or an Indian is a better trade mark in Mexico than any ingenious composite word. The illiterate Mexican asks for his goods by picture, and "Cow" Brand Soap would have a long start over a "Washemclean" brand in attaining popular favor and renown.

* * *

It is estimated that the American women put in about 13,000,000 hours a month during 1918 knitting for United States soldiers and European refugees. From April, 1917 to March, 1919 the American Red Cross produced about 22,000,000 knitted articles of an approximate value of \$41,000,000.

* * *

Chairs of aeronautics have been established in England at the universities of Cambridge and London, and several aeronautical scholarships have been instituted. It is reported also that a number of English public schools have acquired from the Air Ministry aeroplanes, motors and other equipment for

their engineering section. A scheme of aeroplane insurance is also under way in London.

* * *

Windmills to generate electricity have been successfully used on a number of farms in Denmark during the coal-shortage occasioned by the war. The variable force of the wind was the principal drawback, and attempts were made to design special three-phase dynamos which would maintain a constant voltage independent of the speed of the mill.

* * *

A soap bubble a year old may not sound like fact but it is. A scientist discovered recently that the reason soap bubbles die in their infancy is that ordinary air is filled with tiny particles of matter which fall on the bubble and destroy it by altering the surface tension. If you blow your bubbles in clarified air as the aforementioned scientist did you can have hoards of quite ancient and durable specimens.

* * *

Among adaptations of war materials to civilian uses is the use of an 18-pound shell, with the nose and copper band removed, as a shafting coupling. The copper bands are sold for electrical purposes. Experiments with airplane engines have shown that after an alteration in the carburetor they can be run on coal gas, and with couplings made from shells they have been connected to dynamos with very good results.

* * *

Dividends for employes constitute the latest plan of a large American concern. If a workman earns \$20 a week, or \$1,000 a year, and the company's common stock pays 6 per cent interest, that employe will receive \$60 out of profits at the same time that an investor owning \$1,000 worth of stock receives \$60 dividends. Everybody on the payroll, from the president to the office boy, participates automatically in the benefits.

* * *

A wireless telegraph receiver which prints dots and dashes at the rate of 400 words a minute is the latest aid to secrecy, no human ear being capable of interpreting radio messages delivered at such a speed. The receiver contains 1000 feet of sensitized tape upon which a tiny mirror oscillated by the electric impulses prints dots and dashes by a photographic process. An electric motor draws the tape through tubes containing developer, fixing hypo and washing water, passing it finally through a drying oven and delivering a complete record easily deciphered.

PERSONALS

Aubrey Drury of Berkeley, California, has been added to the editorial staff of the Journal of Electricity as Associate Editor. Mr. Drury comes to his new position brim full of ideas of helpfulness for the West. He graduated from the University of California with the class of 1914, in which institution as a student he played a most prominent part, especially along the line of debating with Stanford University and the University of Washington. He later acquired a first-hand knowledge of the West as writer for the advertising bureau of the



Passenger Traffic Department of the Southern Pacific Company. In this capacity he was called upon to visualize the tremendous natural resources and commercial possibilities of the West. As an officer in the Radio Branch of the Air Service during the war, stationed at Washington, D. C., he acquired first-hand knowledge in many matters pertaining to electrical affairs and engineering activities. During recent months his connection with the Extension Division of the University of California as publicity editor has brought him in close contact with affairs electrical. Readers of the Journal of Electricity will find in future issues much of profit and inspiration as a result of the splendid vision of Mr. Drury.

F. M. Feiker, editorial director of the McGraw-Hill papers, is one of the recent prominent eastern visitors to San Francisco.

H. F. Yost, Pacific Coast manager of the Trumbull Electric Manufacturing Company, is making a trip through the Pacific Northwest.

M. H. Wagner of the U. S. Bureau of Standards was recently in Salt Lake City gathering information for the National Electrical Safety Code.

Robert W. Larsen has severed his connection with the M. J. Walsh Electric Company and is now in business for himself at 608 McKay Building, Portland, Oregon.

Geo. A. Boring, Portland manager for the Pacific States Electric Company, was among those who came down from the Northwest to attend the recent convention of jobbers at Del Monte.

C. P. Deming, manager of the Seattle office of the National India Rubber Company, 524 First avenue, South, Seattle, is making a visit to the Salt Lake City office of the company, which is in charge of Ray Ackerman.

Jas. H. McGraw, president of the McGraw-Hill Company, Inc., has returned to New York after a visit of six weeks to the Pacific Coast. During his stay in the West Mr. McGraw visited all the important engineering projects, including Hetch Hetchy.

L. A. Francis, for the past two years connected with the Pacific States Electric Company at Seattle in the capacity of salesman, has resigned his position and will represent the Sherry Water Tube Boiler Company with offices in the Lowman Building, Seattle.

Clarence R. Young, recently transferred from sales manager of the Pacific Power & Light Company to the Bond Division of the American Bond & Share Company at New York, has severed his connection with this company and re-

turned to Portland, Oregon, where he has accepted a position with Clark, Kendall & Company as a bond salesman.

C. E. Yost, president of the Nebraska Telephone Company, the Iowa Telephone Company, and the Northwestern Telephone Company, has resigned from the presidency of the three companies and has been made chairman of the board. He is succeeded by Vice-president W. B. T. Belt.

Herbert W. Gepp, general manager of the Electrolytic Zinc Company of Australasia Pty. Ltd., Melbourne and Hobart, Australia, and Gilbert Rigg of the Broken Hill Associated Smelters Pty. Ltd., Melbourne, Australia, both prominent engineers, are at present visiting San Francisco.

Frank Hodson, president of the Electric Furnace Construction Company, makers of Greaves Etchells furnaces, is touring the principal western cities including Vancouver, Victoria, Seattle, Portland, San Francisco and Los Angeles, and is at present a guest at the Palace Hotel in San Francisco.

J. W. Sanger, Trade Commissioner of the United States Department of Commerce, will leave shortly for a two years' tour in the Far East to study advertising conditions. Mr. Sanger has recently spent two years in South America investigating methods of advertising and selling American goods, and has written several books on the subject.

Dr. Van H. Manning, director of the Bureau of Mines, accompanied by Mr. Bailey, assistant director, Dr. E. W. Dean, in charge of the petroleum work at the Pittsburgh station, and Dr. Kendle, of the Mine Rescue Division, spent several days during the month of August visiting the San Francisco and Berkeley stations of the Bureau of Mines.

R. H. Ballard, of the Southern California Edison Company, president of the National Electric Light Association, and John A. Britton, general manager of the Pacific Gas & Electric Company of San Francisco, have gone east to attend a conference on the policy of the National Electric Light Association, and will visit several of the geographic sections.

G. F. Wakeman, formerly assistant to E. M. Cutting of the Edison Storage Battery Supply Company, with headquarters in San Francisco, has been appointed Pacific Coast manager of the company. As announced in the Journal of Electricity Sept. 1, 1919, Mr. Cutting has been appointed manager of the railroad department of the company at Orange, N. J.

Lee H. Newbert, manager of the Commercial Department of the Pacific Gas & Electric Company of San Francisco, has been appointed chairman of the Committee on Cooperation in the Industry of the National Electric Light Association. Mr. Newbert's committee will endeavor to formulate and submit to the next convention a plan by which all the branches of the electrical business may cooperate. Mr. Newbert has been very active in the California Electrical Cooperative Campaign, of which he has been chairman for several years.

S. M. Kennedy, general agent of the Southern California Edison Company of Los Angeles has accepted his appointment by President R. H. Ballard to

the chairmanship of the Committee on Service of the National Electric Light Association. Mr. Kennedy has but recently returned from a combined pleasure and business trip through the East and Canada where he looked into general conditions and called upon the larger central stations. He is well known throughout the electrical industry both as an executive who has taken a leading part in bettering the relationship between the public utility and



the public and for his able writings along these lines. The Journal of Electricity looks forward with pleasure to the series of articles by Mr. Kennedy on the personal factors of the public utility which will begin in an early issue.

Clyde A. Flint, sales manager of Rathbone, Sard Electric Company, is expected to attend the Seattle convention of the Northwestern Electric Light and Power Association, to present and discuss a paper on Electric Ranges, a paper which will deal with the manufacture and sale of ranges throughout the country this year. Mr. Flint has covered the entire country and is familiar with conditions in various states and the activities of various companies.



J. G. Pomeroy, a prominent manufacturer's agent with headquarters in Los Angeles, is a recent San Francisco visitor.

E. W. Wagy, petroleum engineer of the U. S. Bureau of Mines, has transferred his headquarters from the San Francisco office of the Bureau to the office at Washington, D. C.

A. H. Burdick of the Electric Bond & Share Company, New York, was in Ogden, Utah, recently, inspecting the gas plant of the Utah Power & Light Company, one of the Bond & Share properties.

Morris Wenk, formerly mechanical draftsman with the G. M. Standifer Construction Corporation at Vancouver, has accepted the appointment of instructor in mechanical drawing at Oregon Agricultural College, Corvallis, Oregon.

W. G. Martin, for the past eleven years connected with the North Pacific Service Company at Bremerton, Washington, has resigned his position and intends visiting with his brother in Yakima for several weeks before making connections with another public service station.

Chas. H. Delany, steam power plant specialist with the Pacific Gas & Electric Company of San Francisco, and joint author of "Fuel Oil and Steam Engineering," is on his way to New London, Conn., to attend a convention of the Edison Illuminating Association where he will speak on oil burning.

L. A. Somers, manager of the Coast Equipment Company, with offices in the Merchants Exchange Building, San Francisco, has recently been appointed San Francisco representative of the Pacific Manufacturing and Electric Company of Los Angeles, manufacturers of the "Ever Hot" Water Heater.

Philip K. Condict, vice-president of the International Western Electric Company, has had conferred upon him by the Emperor of Japan the Order of the Rising Sun, Fourth Class, an honor which comparatively few Americans have received. Mr. Condict has been with the Western Electric Company since 1903, his work keeping him mainly in foreign fields.

R. L. Vandernaillen, formerly general manager of the Oro Light & Power Company, is still heart and soul with the electrical industry. At the recent Santa Cruz convention of the California Association of Electrical Contractors and Dealers he furnished excellent fishing entertainment for many of the leaders of the industry present, among them D. E. Harris, vice-president of the Pacific States Electric Company, R. H. Ballard, vice-president of the Southern California Edison Company, and Harry Bostwick, San Francisco district manager of Pacific Gas & Electric Co.



HAVE YOU SEEN THIS MAN?

Fred Cavanaugh is the subject of an inquiry which has reached the office of the Journal of Electricity. Mr. Cavanaugh, who was engaged in the electrical business in Warren, Ohio, left that city some years ago and is believed to be in San Francisco or vicinity. Eastern connections of the Electric Appliance Company of San Francisco are particularly anxious to get in touch with Mr. Cavanaugh concerning a subject of great advantage to him.

D. C. Pence, sales manager, Illinois Electric Company, Los Angeles, has left for the East where he plans to spend a month visiting eastern firms which he represents on the Pacific Coast.

W. Brewster Hall, district sales agent for the Pass & Seymour Company of Solvay, N. Y., is making a two weeks' visit to San Francisco and other Pacific Coast cities. Mr. Hall is perfecting arrangements with the George Gray Company of San Francisco for carrying a full line of the Pass & Seymour stock.

Harry M. Giles has been appointed general superintendent of the South Philadelphia Works of the Westinghouse Electric & Manufacturing Company. Mr. Giles, who succeeds the late Oscar Otto, killed in an automobile accident last month, has been for a number of years past superintendent of marine erection.

C. H. Beal, formerly petroleum technologist of the U. S. Bureau of Mines, with headquarters at the San Francisco office, has severed his connection with the Bureau to enter consulting work. He will make a specialty of oil land valuation and exploration, and has established offices at the Sharon Building, San Francisco.

W. A. Marsden, vice-president of the Electrical Appliance Company, 1214 Third avenue, Seattle, has just returned from a visit through the East including the factories of the Hurley Machine Company and the Edison Electrical Appliance Company, both located at Chicago. While away he also made a study of the merchandising business as carried on by different stores in Illinois and Iowa.

Frank D. Egan, former works manager of the Pittsburgh Iron & Steel Foundries Company, has accepted a position in the General Engineering Department of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa., where he will devote his entire time to the development of electrical apparatus for steel mill application. Mr. Egan is a member of the Iron and Steel Committee of the American Institute of Electrical Engineers, and a member and past president of the Association of Iron and Steel Electrical Engineers.

Capt. C. E. Grunsky, Jr., who is familiar to readers of the Journal of Electricity through articles on mine valuation which appeared in these columns, has again taken up his engineering work in San Francisco after a two years' absence in the Army, during which time he saw active service at the front and supervised the valuation of war losses in French mines. The American Engineering Corporation, of which Capt. Grunsky was a member, has reorganized under the name of the C. E. Grunsky Company and consists of C. E. Grunsky, the well known consulting engineer and valuation expert, E. L. Grunsky, who has specialized in construction work and water problems, and Capt. Grunsky, who takes care of all mining work.

OBITUARY

Hugo Altmayer, president of the Farnsworth Electrical Works of San Francisco, was instantly killed on September 9th at the Coos Bay Lumber Company's yard in Oakland. Mr. Altmayer was widely known for his electrical inventions, and had gone to Oakland to make some tests in connection with crane operation. While he was standing on a crane an electric shock caused him to fall to the pavement below.

Meeting Notices for Electrical Men

(A full announcement has been issued of the program for the Northwest Electric Light and Power Convention at Seattle, and of general plans for the meeting. An interesting report of the National Executive Committee meeting of the N. E. L. A., and of electrical gatherings in San Francisco are among other features of the past two weeks.—The Editor.)

National Executive Committee, N. E. L. A.

The following members were present at the Executive Committee meeting of the National Electric Light Association, held at Association Headquarters on Thursday, August 14th: Martin J. Insull, vice-president; H. C. Abell, W. H. Atkins, George B. Foster, Walter H. Johnson, John G. Learned, George B. Leland, D. H. McDougall, Leon H. Scherck, Frank W. Smith, Paul Spencer, Thomas Sproule; J. C. Van Dwyne, representing R. W. Symes; S. A. Sewall, acting secretary; W. C. Anderson, statistical secretary; A. J. Marshall, secretary Electric Vehicle Section. J. W. Perry, chairman of the Exhibition Committee, attended by invitation.

In the absence of President Ballard, Vice-President Martin J. Insull presided and called the meeting to order.

Chairman Perry presented the report of the Exhibition Committee, reviewing the work done in advance of the convention scheduled for Atlantic City in 1917 and the work accomplished this year. He reported that the prizes of \$150, \$100 and \$50 for the best papers describing the exhibit as a whole had been awarded; that there were 95 exhibitors this year, the largest from the standpoint of number and square feet of space in the history of the Association, and that 25 exhibitors had to be refused on account of their late applications. Mr. Perry also reported the following officers and members of the Executive Committee elected for the year 1919-1920: C. L. Peirce, Jr., chairman; F. H. Gale, treasurer; H. G. McConaughy, secretary. Members of the Executive Committee for one year, J. C. McQuiston, George A. Hughes, G. A. Freeman; for two years, C. L. Peirce, Jr., S. E. Doane, Frank H. Gale; for three years, Charles Blizard, John Mustard, J. W. Perry.

Vice-President Insull read a letter from John F. Gilchrist, chairman of the Publicity Committee, outlining his plans for the committee. These plans provide for the establishment in each state of a committee similar to that already organized in Illinois, which committees will finance themselves and will furnish news bulletins to their members; the chairmen of the state committees to form the personnel of Mr. Gilchrist's main committee. Mr. Gilchrist felt that it would be desirable to include the railway, gas and telephone people, and that this would probably mean that in some cases the chairmen of the state committees would not be electrical men, but he did not feel that there was any objection to this.

The question of distribution of the several handbooks of the Association was referred to a special committee con-

sisting of the chairmen of all national sections, chairmen of the Membership and Company Sections Committee, and the treasurer. This committee is to consider the question of continuing the policy of furnishing the handbooks free or whether some charge might be made for them in order that they might be self-sustaining, and the committee after investigation will report to the president.

The Membership Committee reported new members as follows:

Six central stations, Class A; 7 manufacturers, jobbers, contracting firms, Class D; 203 company employes, Classes D and E; 1 foreign member (Snider & Company, Paris); 1 college professor, Class C; total, 218 new members during the month of July.

The special committees on the subject of Insurance Expert reported in favor of the Association continuing such expert on insurance matters, to be at the disposal of the member companies as well as committees of the Association, and to be available at all times in connection with any cases relative to insurance matters that have to do with the work of the Association; the insurance expert to be ex-officio member of all committees having to do with such matters and to keep the Association informed from time to time of the work of the National Fire Protective Association Committee.

The Executive Committee considered another subject which had been suggested for the Association, namely, that an effort be made to bring about closer contact between bankers and other financial interests with the Association and member companies, in supplying funds

for extensions required by the utilities.

The question of distribution of the Proceedings of the 1919 Convention was considered, the secretary being instructed to send out notice in card form and get replies from members as to which volumes of the proceedings each member desired to receive.

The vice-chairman of the Accounting Section reported the Section committees actively at work, and the affairs of the Section progressing satisfactorily.

A similar report was made by Chairman Foster of the Electrical Vehicle Section, who also reported that the municipal authorities of New York were investigating the broad subject of harbor, steamship and railroad terminal facilities, including transportation of freight over city streets to such terminals. As street transportation is closely associated with electrical vehicles, the chairman advocated an energetic campaign to bring to the attention of the investigating committee the merits of city transportation by means of electric vehicles.

BUILDERS OF THE WEST — LXI



JAMES H. MCGRAW

"Let there be light" has ever been the divine command that has brought into consciousness the intelligence wherewith to govern the affairs of man. That man of vision who sits at the head of a great publishing house, alert to sense the needs of industry and point to the better way, is indeed the empire builder of the first order. To James H. McGraw, president of the McGraw-Hill Company, Inc., publisher of eleven engineering magazines, leaders of thought in their respective fields of activity and carrying a message to 180,000 engineers and commercial men throughout America and the world at large, this issue of the Journal of Electricity is affectionately dedicated.

Chairman Learned of the Commercial Section reported on the second meeting held by that Section at Association Island the first week in August, at which time bureaus and committees were appointed, and he submitted the two following resolutions adopted by the Commercial Section:

"Whereas, The Commercial Section of the National Electric Light Association has given much time and care to the preparation of folders, pamphlets, booklets and handbooks for the purpose of advertising electrical appliances and educating the public to the end that a greater number of electrical appliances will be purchased and used, now therefore be it

"Resolved, That the Executive Committee of the Commercial Section is of the opinion that all advertising, publicity and educational literature prepared by the Commercial Section should be made available to all branches (companies, individuals, etc.) of the electrical industry, whether or not they be members of the National Electric Light Association."

"Whereas, Numerous applications for the Commercial Engineering Course and the Course in Practical Electricity are received from universities for use in their electrical engineering classes, from young men attending schools giving a general education and from central stations desirous of preparing men and women to enter their employ,"

"Resolved, That educational courses prepared by the Association be made available to all who may subscribe to same."

The course of procedure recommended in these resolutions was discussed by the committee, but final action deferred until the next meeting, at which the president will preside.

Electrical Meeting in San Francisco

On August 27th an important luncheon was held at the Palace Hotel at San Francisco, the following electrical men being present: A. E. Wishon, A. H. Halloran, C. C. Hillis, L. H. Newbert, Robert Sibley, Clyde Chamblin, J. W. Redpath, E. O. Shreve, M. T. Dolman, I. W. Alexander, Henry F. Jackson, Paul Downing, A. N. Kemp, D. E. Harris, Jas. H. McGraw, M. A. DeLew.

The luncheon was preceded by a symposium, covering what electrical men are planning for the ensuing year. Mr. Wishon took the chair.

At the luncheon Robert Sibley, editor of the Journal of Electricity, presided and James H. McGraw, president of the McGraw-Hill Company, Inc., announced the forthcoming affiliation of the Journal of Electricity with the McGraw-Hill Company. In commenting on this, John A. Britton, general manager of the Pacific Gas & Electric Company of San Francisco, referred to it as one of the most significant announcements ever made to the electrical industry.

Electrical Picnic in Southern California

The entire electrical fraternity of Southern California united recently at the big Electrical Picnic held at Anaheim Landing, twenty-five miles from Los Angeles.

All the electrical contractor-dealers and jobbers closed their establishments for the day. As the street cars were temporarily out of service, on account of the strike, enough automobiles were procured to convey everyone—their wives, daughters, sons and sweethearts—to the scene of the picnic.

A spectacular ball game held the crowd in a high pitch of excitement the entire morning. The electrical contractor-

dealers, captained by H. B. Woodill of Woodill & Hulse, played the manufacturers and jobbers team, captained by John M. Morris of the Westinghouse Electric & Manufacturing Company. After a thrilling nine innings, Captain Morris came out victorious, with a score of 5 to 0.

The afternoon was spent in various sports arranged by the Sports Committee, consisting of R. J. McHugh, with the



P. H. Gough of Listenwalter & Gough, making one of his long distance drives at the electrical picnic at Anaheim Landing. The golf contest was one of the features of the occasion.

Garnett-Young Company, assisted by W. R. Edwards of the Pacific States Electric Company and Ralph Clapp, manufacturers' agent, recently returned from France.

A golf driving contest routed out the golf enthusiasts and after some spectacular drives, the contest was finally won by D. R. Edwards, with A. W. Childs a close contestant.

Dinner was served at the Tower Inn and was followed by dancing.

The committee in charge of the picnic consisted of J. C. Rendler of the Southern California Electric Company, Paul D. House of the Lamp Shop, representing the electrical dealers; Louis Gans of Gans Bros., representing the Motor Repairmen's Association; L. M. Harper, manager of the Western Electric Company, representing the electrical jobbers, and Carl M. Heintz, Westinghouse Electric & Manufacturing Company, representing the manufacturers.

National Fire Protection Association

Special committees have been appointed by the Chairman of the Electrical Committee of the National Fire Protection Association to consider various questions in anticipation of the 1920 Code. All persons interested in any of these questions are invited to communicate with the Chairman of the Technical Sub-Committee which is dealing with that particular question.



Ralph Clapp, recently returned from service as a Y. M. C. A. Secretary in France, was evidently glad to be back in time to attend the electrical picnic.



H. B. Woodill, president of the Woodill & Hulse Electric Company, and J. M. Morris of the Westinghouse Company, were the competing captains in the ball game played at the electrical picnic at Anaheim Landing. Mr. Woodill's team was selected from the Contractor-Dealers and Mr. Morris's from the Manufacturers and Jobbers. The score was 5 to 0 in favor of the latter team.



A. W. Childs, superintendent of sales with the Southern California Edison Company, looking over the prizes given away at the electrical picnic.

Northwest Electric Light and Power Association Convention

PROGRAM

The business program for the Northwest Electric Light and Power Association convention, which takes place in Seattle on Sept. 24, 25, 26 and 27, is as follows:

Wednesday, September 24

Morning Session —

Address of Welcome—Mayor of Seattle.
President's Address—H. J. Gille.
Resolutions Committee (appointments).
Financial Report.
Committee Reports.
Special Address.
Announcements.

Afternoon Session —

TECHNICAL COMMITTEE REPORT—Chairman G. E. Quinan, Puget Sound Traction, Light & Power Company.

In brief this report covers the valuable work the committee has been doing in connection with National Safety Code, Meters, Transmission, Prime Movers and construction of all kinds.

ACCOUNTING—Editor-in-Chief J. S. Simpson, Washington Water Power Company.

This paper will cover proper methods of accounting, both for city and suburban electric business, setting forth the most desirable methods of handling company and customer's accounts in both these divisions, covering also plans for reducing accounting and billing expense.

Evening Session —

ELECTRICITY TODAY—Dr. Wm. H. Easton, Westinghouse Electric & Manufacturing Company.

Popular lecture for all visitors to the convention, including ladies, also selected guests by invitation. This will be a semi-popular and semi-technical review of the more modern applications of electricity, and will include many of the very interesting and marvelous things developed in an electrical way during the war. The program committee is particularly fortunate in having this subject presented by a national authority. Motion pictures and slides will be used to illustrate this lecture.

Thursday, September 25

Morning Session —

IMPROVING ELECTRICAL MERCHANDISING—Round Table Conference; Chairman, L. A. Lewis, Washington Water Power Company.

To be participated in by speakers assigned by the chairman from among central stations, manufacturers, jobbers, contractors, etc., followed by an open discussion. Conference to be attended by convention as a whole.

This conference will bring before the convention the latest ideas and experiences covering the most progressive methods for increasing appliance sales.

Afternoon Session —

RANGES AND WATER HEATERS—Round Table Conference. Chairman, A. C. McMicken, Portland Railway, Light & Power Company; Vice-Chairman, J. F. Roche, Montana Power Company.

To be participated in by speakers assigned by the Chairman from among central stations, manufacturers, jobbers, contractors, etc., followed by an open discussion. Conference to be attended by the convention as a whole.

This conference will bring before the members much very valuable information and specific data, and it is planned that all the important questions in connection with the range and water heater business will be presented from varied sources, embracing design, contemplated changes, maintenance, distribution problems, diversity factor, cost of ranges, water heaters and maintenance, rates, etc. It is desired also to reach a conclusion on the general subject, "Have Experiences in the Past Three Years Fulfilled Expectations?"

Friday, September 26

Morning Session —

VALUE OF PUBLIC UTILITY WAR EXPERIENCES AND THEIR EFFECT ON THE FUTURE—Editor, W. H. McGrath, Puget Sound Traction, Light & Power Company.

This paper will bring before the convention in a broad way the benefits to be derived in the future from our recent experiences in handling the problems confronting central stations during the war, covering such important matters as investments, service, rates, extensions and future relations with the public.

Afternoon Session —

INDUSTRIAL ELECTRIC HEATING—C. A. Winder, General Electric Company.

This is a very valuable paper covering such important features as The Electric Furnace, Heat Treating, Gun Shrinking, Enameling, Core Baking, Welding, Fruit and Vegetable Drying, Bake Ovens, Vulcanizing, in fact every conceivable beneficial application of electric heat to the industries from the largest to the smallest; also forecasting the possibilities of this branch of our business constituting the major portion of future central station loads.

Immediately following this paper will come the report of the nominating committee and the election of officers.

The Program Committee in charge of the arrangements consists of R. W. Clark, chairman, A. C. McMicken and T. A. Lewis.

In addition to the business program, an attractive series of events has been planned by the Entertainment Committee, under the chairmanship of J. I. Colwell, as follows:

Thursday, September 25th—Afternoon theatre party for the ladies, the name of the theatre and time to be announced at the time the ladies register.

Friday, September 26th—Banquet Friday night, 6:30 p.m., at the Army and Navy Club on Third Avenue.

Saturday, September 27th—This will be the first golf tournament, which it is hoped will become an annual event. In view of the increasing interest taken in the game by the members of the Northwest Light and

Power Association, it has been decided to inaugurate an annual handicap competition for a trophy to be known as the "Kilowatt Cup." This will be the property of the winner for one year unless he should win it the second time. A small replica will become the permanent property of the winner of the tournament. A special event known as the Kickers' Handicap will be played simultaneously with the tournament for the "Kilowatt Cup."

The tournament will be played at Jefferson Park Golf Club. Automobiles will leave Washington Hotel at 9 a.m. sharp. Entries must be made not later than 6 p.m. Friday, Sept. 26th at the headquarters of the Seattle Press Club. Competitors will play 18 holes Medal Play on handicap as assigned by the committee, R. T. Stafford and H. H. T. Van Riper.

Registration for the convention will be at the Press Club headquarters, Fifth and University streets.

Through the Journal of Electricity arrangements have been made for a special car, which will leave San Francisco for Seattle at 10 p.m. on Monday, Sept. 22. Among those going north to the convention are: A. E. Wishon, assistant general manager of the San Joaquin Light & Power Corporation, W. H. Onken, Jr., editor of the Electrical World, Robert Sibley, editor of the Journal of Electricity, W. S. Berry, Pacific Coast sales manager for the Western Electric Company, and D. E. Harris, sales manager of the Pacific States Electric Company.

PROPOSED CHANGES IN CONSTITUTION

Amendments will be made to the Constitution with the idea of effecting certain changes in organization and procedure that will make the Association more effective and work to better advantage.

It is proposed to greatly strengthen local activities through the Public Policy Committee for each state. These committees are to be composed of a representative from each Class A member and are to be largely self-governing in all matters of public policy as they pertain to each state. A fixed division of funds going into the Association's treasury is to be made between the Association's needs for the general conduct of its work and the work of the local committees. Local committees are also to be empowered to levy an equitable assessment upon Class A members when necessary, with the approval of the Executive Committee, and as all Class A members are represented on the local committee no such action will be taken unless acceptable to those who must meet any assessment. Funds for the benefit of local committees are to be disbursed by the treasurer to the vice-president for each state, through whom local public policy affairs will be largely directed.

It is proposed to further amend the Constitution by providing for reconstituting the Executive Committee, the governing body of the Association. The committee is to consist of the president, the retiring president and three members at large, as already provided, but instead of the other four members being elected at large the vice-president for each state, Idaho, Montana, Oregon and Washington, will be a member. The vice-presidents, under the new arrangement, are to be more active, to direct state activities, and appoint the Public Policy Committee for each state.

Geo. L. Myers, chairman of the Public Policy Committee for Oregon, has proposed that the activities of the membership be specifically directed, and in this connection has suggested the organization of the membership into sections, in order that the members may be in position to exert their efforts in Association activities along lines in which they are engaged and interested. In this manner it is hoped to get more out of the membership and arouse and maintain the interest of the individual.

The article providing for sections is as follows:

ARTICLE XIV Sections

Section 1. Members shall be classified into sections, and there shall be the following sections:

Accounting,
Commercial,
Public Relations,
Technical.

Section 2. Each section shall have a Governing Committee, of not less than three nor more than nine members, to be appointed by the president, and the chairman of the Governing Committee of each section shall be named by majority vote of said committee.

Section 3. The term of each member of the Governing Committee of each section shall be three years from the 30th day of September of the year of appointment; provided, that the term of one-third of the members of each committee shall terminate each year, the term of one-third of the members appointed by the president elected in September, 1919, to terminate with the years ending September 30, 1920, September 30, 1921, and September 30, 1922.

Vacancies shall be filled by appointment by the president for the unexpired term.

Section 4. Membership in each section shall be optional with any member and shall be continuing at the option of any member, and any member may change his affiliation from one section to another section, except that he can be a member of no more than one section; provided, that the president shall direct the classification of any member who has failed to specify affiliation with any section within a reasonable time.

Section 5. The president shall appoint the Governing Committee of each section within thirty days after the completion of the classification of the membership of each section, and the president shall direct and complete the classification of the membership of each section as provided for herein under such rules and regulations as the president may prescribe within a period of ninety days following the adoption of this Article; and thereafter the president shall prescribe the rules and regulations for classification and re-classification.

San Francisco Electrical Development League

The Electrical Development League of San Francisco held a well-attended and enthusiastic meeting on September 8th, at which John S. Poland, Pacific Coast sales manager of the Safe Cabinet Company, gave an interesting talk on protecting valuable records. Henry Bostwick, president of the League, expressed his gratification at the large attendance, this being the first meeting since summer vacation.

One of the events of the meeting was the presentation of a fountain pen to E. M. Cutting who goes East shortly to take the position of manager of the railroad department for the Edison Storage Battery Company at Orange, N. J.

F. M. Feiker of the McGraw-Hill Company, Inc., announced the affiliation of the Journal of Electricity with the McGraw-Hill Company.

Among the distinguished guests was S. M. Kennedy, general agent of the Southern California Edison Company, who has recently returned from the East, and who spoke a few words on the subject of the strong Eastern interest in the electrical progress of the West.

The N. E. L. A. Convention

Already there is an interesting rivalry among the cities of Southern California for the honor of being selected as the place of holding the 1920 convention of the National Electric Light Association. The news that the next convention of the national organization was to be held somewhere in the southwest was well rated by the committees of city councils and chambers of commerce of the larger cities of the Southwest, and President R. H. Ballard is in receipt of a number of invitations which he will submit to the Executive Committee at its meeting in September. A selection will no doubt be made at this meeting, after which the first preliminary work for the session will be put under way.

Los Angeles, the metropolis of the Southwest, with a national reputation as a convention city and rated for the hospitality it extends to those who visit it as representatives of important organizations, is eager to secure the convention. Its magnificent hotel accommodations, its central location, its proximity to the chain of beach resorts and its wonderful roadways and interurban electric lines, radiating in all directions, have much to commend it.

Pasadena, the Crown City of the San Gabriel Valley, under the shadow of Mt. Wilson and in the center of some of the most beautiful scenery in Southern California and only nine miles from Los Angeles, would be an ideal place for the session.

Riverside, in the center of the great orange and lemon belt, with superb scenery on every hand and close to some of the great hydroelectric plants, desires to be considered.

San Diego, on one of the most remarkable natural harbors in the world, with magnificent hotels and all the attractions that eastern visitors enjoy, has presented its claims.

Santa Barbara, the romantic and historic city by the sea, with its lore of other days, its wonderful old mission, some of the best hotels in the West and excellent facilities for entertaining, has also put in a request for the coveted honor.

President Ballard says that he will try to present all of these requests to the members of the Executive Committee in as impartial a manner as possible, requesting the members to make the selection, as he feels those who reside in other sections of the country should be best qualified to choose the place that would best suit the visitors to Southern California.

AIMS OF THE GEOGRAPHIC SECTIONS OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION

By R. H. Ballard, President N. E. L. A.

In the Geographic Section we provide the electrical industry with the intermediating link between the central station, which is the unit of activity from which ideas naturally germinate, and the National Electric Light Association, which is transcontinental in its policies and its aims.

In the Geographic Section the greatest opportunity is offered for personal contact and interchange of ideas between executives and employes of the company and all others interested in the electrical industry within the territory where conditions are frequently identical and usually similar.

In the Geographic Section the results of progress made and new ideas demonstrated by one company may be quickly conveyed to other companies in the same territory.

In the Geographic Section opportunity is afforded men to think in broader terms and to apply their reasoning along sectional lines. This is the logical sequence of development—company to section; section to nation. The natural foundation for this line of progress is the company sections, and its importance is inestimable.

In the Geographic Section the maximum opportunity is presented for cementing all branches of the industry into one harmonious whole; of increasing the sphere of influence exercised by those engaged in our profession, and in eventually creating a better understanding between the public served and those whose duty it is to serve the public.

In the Geographic Section a complete understanding should be reached between central stations, manufacturers, jobbers and contractor-dealers, as to the rightful place in the industry occupied by each group and in establishing the relations of one branch of the industry to the others.

In the Geographic Section we have a place where misunderstandings, frictions, petty jealousies and fancied injuries can be ironed out and adjusted by bringing about a full and complete realization by all members of the section of the responsibility of service to the public and the joy of working out practical accomplishments of the ideal.

In the Geographic Section can best be worked out a definite plan by which the public may be kept informed on the true status of utility service in the district served.

In the Geographic Section there is ample opportunity for constructive initiative, and the opportunities for its exercise could be amplified indefinitely, the scope of achievement having no limitation but brains and ability.

In the Geographic Section we have the medium of crystallization; demonstrating and applying locally when local, and making universal when universal all of the constructive creative forces that exist in the minds of the great membership of the National Electric Light Association.

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers

President—Calvert Townley, Westinghouse Electric & Manufacturing Company.
Secretary—F. L. Hutchinson, Engineering Society Bldg., New York City.
Meetings—Monthly.

Los Angeles Section

Chairman—J. H. Cunningham, General Electric Co., Los Angeles.
Secretary—Clem A. Copeland, Bureau of Power and Light, Los Angeles.
Meetings—Second Tuesday of each month.

Portland Section

Chairman—W. D. Scott, Pacific Telephone & Telegraph Company, Portland, Ore.
Secretary—E. H. Le Tourneau, Portland Railway, Light & Power Company, Portland, Ore.
Meetings—Monthly.

Denver Section

Chairman—Prof. H. S. Evans, Univ. of Colorado, Boulder.
Secretary—Robt. B. Bonney, Mountain States Tel. & Tel. Co., Denver, Colo.
Meetings—Third Saturday of each month, at the Shirley Hotel.

San Francisco Section

Chairman—W. G. Vincent, 445 Sutter St., San Francisco.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings—Fourth Friday each month—Engineers' Club, 7 p.m.

Seattle Section

Chairman—John Harisberger, 4015—4th Ave. N. E., Seattle, Wash.
Secretary—T. C. Smith, City Lighting Department, Seattle, Wash.
Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.

Spokane Section

Chairman—George Nixon, Main and Lincoln Sts., Spokane.
Secretary—C. H. Hoppin, 1128 W. Kiernan Ave., Spokane.
Meetings—Third Friday of each month.

Utah Section

Chairman—A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
Secretary—H. T. Plumb, 183 U St., Salt Lake City, Utah.
Meetings—Third Wednesday of alternate months, 8 o'clock. Assembly Room of Commercial Club, Salt Lake City.

Vancouver Section

Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch

Chairman—A. E. McMahon, University of California, Berkeley, Cal.
Secretary—D. D. Davis, University of California, Berkeley, Cal.

University of Colorado Branch

Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

Idaho University Branch

Meetings—First Wednesday evening of each month from October to June.

University of Washington Branch

Chairman—Jack Tolmie, Univ. of Washington, Seattle.

Secretary—Glen Walker, Univ. of Washington.
Meetings—Monthly, first Tuesday, Forestry Bldg.

Oregon Agricultural College Branch

Chairman—Lawrence Fudge, Oregon Agr. College, Corvallis, Ore.
Secretary—Otto L. Cantrall, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch

Montana State College Branch
Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.

Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Throop College of Technology Branch

Chairman—Mark Sawyer, Throop Dormitory, Pasadena, Cal.

Secretary—Russell Otis, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch

Chairman—Clarence E. Guse, Pullman.
Secretary—Ralph C. Guse, State College of Washington, Pullman.
Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS

National Association of Electrical Contractors and Dealers

Chairman—W. Creighton Peet.
Secretary—W. H. Morton, 110 West 40th St., New York.
Executive Committeemen, Pacific Division—J. R. Tomlinson, Portland, J. F. NePage, Seattle, Wash.

Electrical Contractors & Dealers of Salt Lake City

President—G. W. Forsberg.
Secretary—E. H. Eardley, Eardley Bros., Salt Lake City.

British Columbia Ass'n Electrical Contractors and Dealers

President—E. Brettell, Vancouver, B. C.
Secretary—Capt. W. J. Conway, Vancouver, B. C.
Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers

President—M. A. De Lew, 180 Jessie St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Monthly.

Denver Electrical Contractors' Association

President—E. C. Headrick.
Secretary—C. N. Shannon, 227 Coronado Bldg.
Meetings—2nd and 4th Monday nights of each month.

Electrical Contractors and Dealers Ass'n of San Francisco

President—C. L. Chamblin, 641 Mission St., San Francisco.
Secretary—Louis R. Ardouin, San Francisco.
Meetings—Friday, 12:30; New Call Bldg.

Southern California Electrical Contractors and Dealers

President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.
Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.
Meetings—Every Friday at 6:30 p.m. at the Pin Ton Cafe, 427 South Broadway.

Monterey Bay Electrical Contractors and Dealers

President—W. Cox, Santa Cruz.
Secretary—D. K. Noggle, Monterey.

Nevada Ass'n of Electrical Contractors and Dealers

President—F. V. McAvoy, 138 N. Canter St., Reno.
Secretary—R. W. Shearer, 215 Sierra St., Reno.
Meetings—Twice a month, 15th and 30th.

Oregon State Ass'n of Electrical Contractors and Dealers

President—R. C. Kenney, 388 Burnside street, Portland.
Secretary—J. Willis Oberender, 209-10 McKay Bldg., Portland, Ore.

Portland Local Ass'n of Electrical Contractors and Dealers

President—Roy C. Kenney, Portland.
Secretary—H. C. Jones, 306 Concord Bldg., Portland.
Meetings—Alternate Mondays at Imperial Hotel Grill.

Sacramento Section, California Electrical Contractors & Dealers' Association

President—W. H. Gribble, Sacramento.
Secretary—H. Berg, Sacramento.

Washington Ass'n of Electrical Contractors and Dealers

President—V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.
Secretary—Forrest E. Smith, Seattle, Wash.
Meetings—Quarterly—second Thursdays of March, June, September and December.

JOBBER'S ASSOCIATIONS

Electrical Supply Jobbers Association

General Secretary—Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.
Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers

President—T. E. Bibbins, 575 Mission St., San Francisco.

Secretary—Albert H. Elliot, 544 Market St., San Francisco.

Meetings—Quarterly.

Electrical Credit Ass'n of the Pacific Coast

President—J. H. Zweifel, Electrical Appliance Co., San Francisco.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.

Meetings—annually; San Francisco; May.

OF ELECTRICAL INTEREST

California Electrical Cooperative Campaign

Chairman Advisory Committee—L. H. Newbert, 445 Sutter St., San Francisco.
Secretary—Captain Howard Angus, New Call Bldg., San Francisco.

Colorado Electric Light, Power and Railway Association

President—E. A. Phinney, Jefferson Co. Power & Light Co.
Secretary—Treasurer—F. P. Safford, Denver Gas & Electric Co., Denver, Colo.

National Electric Light Association

President—R. H. Ballard, Southern California Edison Company.
Secretary—T. Comerford Martin, 29 West 39th St., New York.

Nebraska Section, N. E. L. A.

President—T. H. Fritts, Central Power Company, Grand Island, Neb.
Secretary—Treasurer—B. H. Conlee, Beatrice Gas & Electric Company, Beatrice, Neb.

Nevada Section, N. E. L. A.

Chairman—Geo. A. Campbell, Reno, Nev.

Pacific Coast Section, N. E. L. A.

President—A. E. Wishon, San Joaquin Light & Power Corporation, Fresno, Cal.
Secretary—A. H. Halloran, Journal of Electricity, Electric Bldg., San Francisco.
Meetings—Annually, in April.

Portland Section, N. E. L. A.

Chairman—F. H. Murphy, Portland Railway, Light & Power Company.
Secretary—Geo. Bowen, Portland, Ore.

Illuminating Engineering Society

President—S. E. Doane.
Secretary—Clarence L. Law.

Western Representatives—Romaine Myers, Bacon Bldg., Oakland, Cal.; C. M. Masson, Edison Bldg., Los Angeles; F. H. Murphy, Portland Railway Light & Power Company, Portland, Ore.; W. R. Putnam, Utah Power & Light Company, Salt Lake City; Fred A. Osborn, University of Washington, Seattle, Wash.
Meetings—First Tuesday each month.

New Mexico Electrical Association

President—D. W. Morgan, Las Cruces, N. M.
Secretary—Charles Twogood, Albuquerque, N.M.
Meetings—Annually, in February.

Southwestern Electrical and Gas Association

President—W. A. Sullivan, Shreveport, La.
Secretary—H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Northwest Electric Light and Power Ass'n

President—H. J. Gille, Puget Sound Traction Light & Power Co.
Secretary—W. E. Herring, Puget Sound Traction, Light & Power Co.

Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.

Los Angeles Jovian Electrical League

President—A. E. Peat, San Joaquin Light & Power Corp.

Secretary—Frank Weiss, Los Angeles Gas & Electric Corp.

Meetings—Every Wednesday, 12 m.

San Francisco Electrical Development League

President—Henry Bostwick, 445 Sutter St., San Francisco.

Secretary—J. W. Redpath, Rialto Bldg., San Francisco.

Meetings—Every Monday, 12:10 p.m.; luncheon, Palace Hotel.

Electric Metermen's Association

President—J. E. Bridges, Westinghouse Electric & Manufacturing Company.

Secretary—A. E. Coney, Great Western Power Company, San Francisco.

Meetings—About every 60 days.

Alameda County Electrical Club
 President—George Drew, Pacific States Electric Company, Oakland, Cal.
 Secretary—George B. Furniss, Pacific Gas & Electric Company, Oakland, Cal.

Synchronous Club
 Secretary—H. N. Beecher, City Hall, Los Angeles.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section
 President—W. H. Brommage, Pacific Tel. & Tel. Co., San Francisco.
 Secretary—Chas. H. Dobson, 835 Howard St., San Francisco.

MECHANICAL ENGINEERS

National Officers
 President—Mortimer E. Cooley, Electrical Engineering Dept., Ann Arbor, Mich.
 Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

San Francisco Section, A. S. M. E.
 President—W. F. Durand, Stanford University, Palo Alto, Cal.
 Secretary—Jas. A. Kinkead, Rialto Bldg., San Francisco.
 Meetings—Quarterly.
 Thursday lunches have been arranged at the Engineers' Club, 57 Post St.

Los Angeles Section, A. S. M. E.
 President—Charles H. McGuire.
 Secretary—T. J. Royer.
 Meetings—Quarterly.

ENGINEERS' CLUBS

Oregon Society of Engineers
 President—John W. Cunningham, 414 Spalding Bldg., Portland.
 Secretary—Orrin E. Stanley, Box 973, Portland.
 Meetings—Annual: First Monday in February.
 Monthly: Third Thursday of each month.
 Third Thursday of each month.

The Engineers' Club of Seattle
 President—H. E. Horrocks, Seattle, Wash.
 Secretary—E. J. Bartells, Northern Life Bldg., Seattle, Wash.
 Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco
 President—A. E. Chandler, New Call Bldg., San Francisco.
 Secretary—J. R. Brownell, Manufacturers' Indemnity Exchange, San Francisco.
 Annual Meeting: October.

Idaho Society of Engineers
 President—W. H. Gibson, Mountain Home, Idaho.

Secretary—Ira F. Shaffner, Boise, Idaho.
Engineers' Club of Oakland
 President—R. S. Chew, Oakland Chamber of Commerce, Oakland.

Engineers' Club of Sacramento
 President—George S. Nickerson, 914 Forum Bldg., Sacramento.
 Secretary—P. M. Noeboe, State Department of Engineering, Forum Bldg., Sacramento.

Colorado Engineering Council
 President—Arthur Ridgway, 810 Equitable Bldg., Denver.
 Secretary—Robert J. Grant, 614 Interstate Trust Bldg., Denver.

United Engineering Societies of San Francisco
 Chairman—C. D. Marx, Stanford University.
 Secretary—Nathan Bowers, Rialto Bldg., San Francisco.

Joint Committee Technical Societies of Los Angeles
 Chairman, George A. Damon, San Fernando Bldg., Los Angeles.
 Secretary—W. K. Barnard, 705-5 Central Bldg., Los Angeles.

Utah Society of Engineers
 President—Leonard Cahoon.
 Secretary—Wm. H. Kelsey.
 Meetings—3rd Wednesdays except May, June, July and August.
 Annual banquet—May.

MISCELLANEOUS

American Ass'n for the Advancement of Science—Pacific Division
 President—John Campbell Merriam, University of California; Acting Chairman National Council of Research.
 Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.
 Meetings—Annual.

Portland Section A. S. C. E.
 President—P. H. Dater, Eng. U. S. Forestry Service.
 Secretary—C. P. Keyser, Park Bureau, Portland, Oregon.
 Meetings—At call of president.

Spokane Engineering & Technical Ass'n
 President—L. K. Armstrong, A. S. M. E.
 Secretary—A. D. Butler, City Engineer, Spokane, Wash.
 Meetings—Third Friday of each month. Joint with A. S. C. E., A. I. E. E. and A. S. M. E.

Foreign Trade Club
 President—W. H. Hammer, Monadnock Bldg.
 Secretary—Wm. E. Hague, Monadnock Bldg.
 Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.

Pacific Coast Gas Association
 President—John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.
 Secretary—Henry Bostwick, 445 Sutter St., San Francisco.

Society for Promotion of Engineering Education
 Secretary—F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

HAPPENINGS IN THE INDUSTRY

INSPECTION TOUR OF CALIFORNIA RAILROAD COMMISSION

Members of the California Railroad Commission and representatives of the Pacific Gas & Electric Company recently completed an important six-day inspection trip in northern and central California, visiting 12 of the 13 hydroelectric plants of the company. The tour was taken as part of the commission's program of conferring with officials of the various power interests, to encourage greater production of electric energy.

The inspection party consisted of E. O. Edgerton, president of the Railroad Commission, and Commissioners Harley W. Brundige, Frank R. Devlin and Irving Martin. Others in the commissioners' group were H. G. Butler, power administrator; Gaskell Jakobs, assistant engineer, and E. T. McGettigan, recorder of the commission.

The representatives of the Pacific Gas and Electric Company in the party were John A. Britton, vice-president and general manager; A. F. Hockenbeamer, treasurer; John A. McCandless, director; C. P. Cutten, attorney; F. S. Myrtle, publicity manager; W. G. Vincent, valuation engineer, electric department, and F. A. Leach, Alameda district manager.

From Sacramento, Governor Stephens accompanied the party to the Drum plant on the American River, where he enjoyed an exhilarating ride on the precipitate tramway up the canyon-side.

RAILROAD COMMISSION REGULATIONS ON SERVICE

All gas served by gas utilities of California to consumers must now contain 570 British thermal units on an average each month with a variation of not more than thirty units. This is the fundamental requirement of new standardization of quality and service of gas utilities established by the Railroad Commission in its General Order No. 58, effective September 1. The order also provides a complete set of general rules governing the relations between gas util-

ities and their consumers. In addition, special rules governing the Pacific Gas and Electric Company's field have been authorized, and somewhat similar rules have been authorized for the electric service.

In order to regulate the gas supplied all California consumers the Commission's Gas and Electric division will, in September, expand its work and give regular attention to all the gas plants by inspection and testing and by every other form of supervision necessary to see that the public gets standard gas. The order prescribes operating schedules for gas plants with a view to improving efficiency and bettering service, and inspection of all gas plants and their operation by a gas inspector of the Commission.

The Commission requires that every gas bill shall set forth clearly the meter readings and the gas consumed, together with such other information as will make clear to the consumer that he is being correctly billed.

Standard methods are prescribed for the testing of gas meters, and utilities are required to make periodic tests and not allowed to install any meter which is inaccurate by more than 1 per cent. Utilities are required to make tests of gas meters upon request by consumers without charge except where the meter has been tested within six months prior to the date of the request, in which case a consumer may obtain a test by making a deposit depending upon the size of the meter.

While General Order No. 58 governs alike all gas utilities in their general service, the order may be amplified by special rules for most of the larger systems from time to time. These special rules are more in detail and modified according to the district affected and the basis of the manufacture and distribution.

The first special rules which cover gas are comprised in Decision No. 6543 of the Railroad Commission which authorizes rules and regulations governing the system of the Pacific Gas & Electric service.

The rules adopted are for gas and electrical service separately (electrical in Decision No. 6542) and the main points covered are the establishment and reestablishment of consumers' credit to obtain service, the return of deposits to be paid by the company, discontinuance of service, disputed bills and the method of adjusting them, meter tests and the adjustment of bills for meter error.

A dispute, of course, which cannot be adjusted by the observance of these rules will be handled by the Commission.

NEW INSTALLATIONS IN COLORADO

The Grand Junction Electric Gas & Manufacturing Company at Grand Junction, Colorado, has recently installed a 750-kva. General Electric turbine and generator to replace two Corliss engine units. Automatic stokers will also be added to the boiler equipment in a general revision of the plant.

NATIONAL ADVERTISING

A Letter to the Editor

I have just finished reading the article on page 166 of the August 15th issue of your valued magazine, written by Mr. Hugh Kimball. That section of the article referring to advertising can hardly be considered a just statement of facts.

Mr. Kimball admits that national advertising is a necessary adjunct to the marketing of any product, and then goes on to say that in proportion as it eliminates the retail dealer it becomes of less selling value. Frankly, I do not understand this statement, as I have no knowledge of any national advertising which does not build up the dealer and which advocates any principle other than the distribution of goods through the logical channels of distribution, i. e., manufacturer to jobber to retailer, and thence to the consumer.

Mr. Kimball states that by eliminating the expense of national advertising, the manufacturer of the cleaner he is selling is able to give the dealer better discounts, and intimates that like action by manufacturers of nationally advertised goods would be acceptable and desirable.

I am inclined to believe that the manufacturer of the cleaner referred to is possibly a local concern who is not attempting to nationalize his product, due perhaps to lack of plant capacity or capital to expand his business. Such a manufacturer could give his dealers larger discounts with the expectation that the dealer would create a demand locally for his product.

If the manufacturers of nationally advertised goods had not paved the way with persistent and continuous advertising in widely-read magazines, thereby selling the idea of modern housekeeping methods to the housekeepers of the land, it is questionable whether the local advertising of an unknown article would be productive. Surely, the spasmodic advertising of local dealers would not create the desire to buy, in the mind of the reader who had not previously heard of the device advertised.

In the personal desire for larger discounts, this particular retailer is overlooking the manufacturer's requirements entirely, and should realize that if it were not for national advertising creating a large demand so that factories are able to enjoy a continuity of production, retail prices would undoubtedly be higher and the margin of profit for the distributor would unquestionably be less. Furthermore, it is only by national advertising in the very best mediums that the manufacturer can ever hope to sell a sufficient quantity of his product to make manufacturing profitable.

In view of the erroneous impression which the average reader might obtain from Mr. Kimball's article, the writer will thank you to give these facts due prominence in an early issue of your valued magazine.

Yours very truly,

H. C. HOPKINS,
San Francisco Publicity Division,
Westinghouse Electric & Mfg. Co.

The Pacific Coast convention of the American Institute of Electrical Engineers, which will take place in Los Angeles September 18-20, is the first which the Institute has held in two years, and for this reason is of more than usual interest. The exceptional program for the event was published in our last issue. It is hoped that there will be a very large attendance at this important gathering and that sections all over the country will make a point of having delegates in attendance, and keeping in touch with the developments. No Western engineer can afford to miss this convention.

TRADE NOTES

New Incorporation —

The Meyers Electric Safety Switch Company of San Francisco has been incorporated for \$15,000 and has been given permission by the California State Corporation Commissioners to sell to the public 5,000 shares of stock at \$1.00 per share. The company will engage in the manufacture and sale of enclosed externally operated safety switches, and the manufacture of metal cut-out and switch boxes.

New Branch Store —

Pass & Seymour, Inc., of Solvay, N. Y., announce the opening of a branch store under the management of the George Gray Company of San Francisco. Their growing business and their many friends on the Pacific Coast have brought about this extension, while the George Gray Company's established position in San Francisco will render them particularly capable of handling the Pass & Seymour line.

Removal Notice —

The Ward Leonard Electric Company, Mount Vernon, N. Y., manufacturers of Vitrohm, vitreous enameled, resistor units, lamp dimmers, rheostats and electrical controlling devices, announce the removal of the office of their Philadelphia representative, William Miller Tompkins, from the Commonwealth Building to the Bourse Building, Machinery Exhibit, Philadelphia.

Electric Furnaces —

The Electric Furnace Construction Company, Finance Building, Philadelphia, advises the receipt of an order from the Hammond Steel Company, Syracuse, N. Y., for one 3-ton furnace for the manufacture of high grade tool steels.

A Greaves-Etchells Furnace is also being installed for the Hong Kong Foundry Company, China.

New General Manager —

The Richardson-Phoenix Company, lubrication engineers and manufacturers of Milwaukee, Wis., announce the appointment of L. E. Strotham, formerly manager of the Steam Turbine and Pumping Engine Departments of the Allis-Chalmers Manufacturing Company, to the position of general manager of their firm.

New Store —

Smith-McCoy Electric Company have moved to 104 Fifth street, Portland, Oregon. Their new store is the last word in neatness of arrangement and appearance.

Change of Offices —

The office of the Hemingray Glass Company at Covington, Ky., has been combined with the office at their factory, Muncie, Ind. The change was made beginning Sept. 8th.

LATEST IN EVERYTHING ELECTRICAL

(Switches for special purposes and of various new designs are featured in this review of recent industrial developments, including a new switch for high tension transmission. The growing prominence of the safety idea is illustrated by a Westinghouse rheostat which is enclosed in a steel cover with special insulation.—The Editor.)

SAFETY ENCLOSING COVER FOR CONTROLLING RHEOSTATS

As a result of almost continual wide-spread "Safety-First" campaigns, the necessity for safeguarding all machinery and those who operate it is now generally recognized throughout the realm of industry as a matter of vast importance. In the electrical field rapid progress has been made in the past few years in designing new lines of apparatus, and redesigning old ones to make the safety feature more prominent; particular attention has been paid to motor control device because, as a rule, this class of apparatus is handled either by unskilled labor or by those not familiar with electrical machinery, and the necessity for a fool-proof installation is the more obvious.

The fact plate rheostats manufactured by the Westinghouse Electric & Manufacturing Company of East Pittsburgh, Pa., are protected, and the enclosing covers are so designed that they can readily be applied to old rheostats to make old installations strictly modern.

The enclosing cover is a solid sheet steel box which fits tightly against the rheostat base and is secured by four corner bolts. Pivoted to the cover are two cast iron arms, one with the operating handle on the outside, and one within made with a fork to engage the rheostat handle. To apply a safety cover to an old rheostat it is only necessary to remove the four nuts on the corner studs of the face plate and replace them with adapter nuts and studs, furnished with the cover. The rheostat handle is also removed and a fiber tube substituted. The cover is then put on so that the fork on the inner arm engages the insulating tube and the four nuts that were on the original rheostat are used to fasten the cover in place. The lead wires from the rheostat are brought through insulating bushings that are held in place by the edge of the cover. While no packing is used to make the cover water-tight, it fits so closely that it effectually prevents the entrance of metal chips, saw dust, or other material that would cause injury to the rheostat. The cover is grounded through the corner bolts and being insulated from live parts, renders it fool-proof and makes it impossible for an operator to accidentally receive a shock through coming in contact with the working parts of the face plate.

The use of these covers or similar devices is one of the important requirements of the modern factory or machine shop, and in some localities it is demanded by law. These

covers fulfill all requirements of a safety-first device and are easily and readily installed.

SWITCHES FOR HIGH TENSION TRANSMISSION

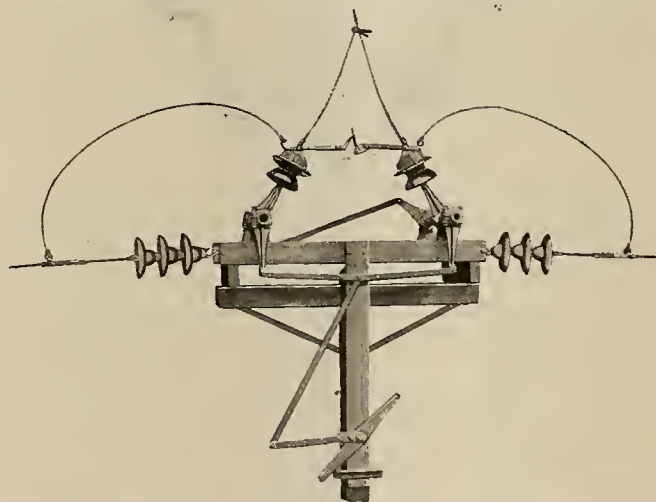
The George Cutter Company of South Bend, Ind., are placing on the market the first items of a line of high tension transmission equipment which will be sold under the trade name of "Clear Break Equipment."

The first of these items is an outdoor air break switch which is designed for rupturing load current under the most severe conditions. This switch is designated the Type "T" switch, and will be furnished regularly in 150-200 ampere capacities and for rated voltages of 22, 33, 44, 55 and 66,000. Developments now under way will take care of voltages of 90,000 to 150,000 and higher if desired.

These switches will be furnished hand operated automatic or non-automatic overload release, also motor operated automatic or non-automatic overload release. Inasmuch as standard series and shunt trip mechanisms will be used in connection with standard circuit closing relays, time element devices are readily applicable.

The switches may be obtained in one, two or three-pole arrangement, and are readily mounted on wooden poles or steel towers.

The Type "T" switch is provided with an auxiliary or arcing contact (not a horn) which ruptures the line current



View showing one leg of the Type T 33,000-volt switch in closed position. This switch is provided with an auxiliary contact which ruptures the line current at its tip when opening.

at its tip when opening. The arc is thus drawn at a point well above the grounded framework and is drawn in a vertical plane parallel to the phases. This prevents shortening of phase spacing in opening and this, in connection with the quick, long break given, insures prompt interruption of the current.

The second item announced at this time is a line of switches known as the Type "D," which are designed for disconnecting purposes only but are arranged to operate all legs of the switch simultaneously from a ground lever which may be readily locked in either the open or closed position.

The especially novel feature in connection with the Type "D" line of switches is the fact that only a pole and the



Westinghouse Rheostat ready to attach cover, showing adapters replacing nuts, and fibre tube replacing handle.



Westinghouse Rheostat with Face Plate Cover attached

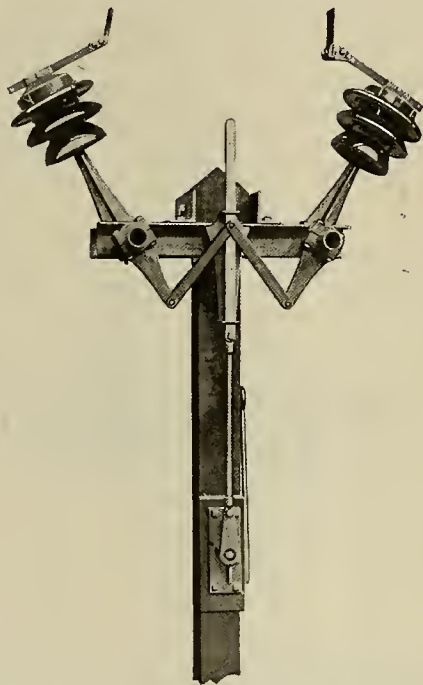
strain insulators for dead ending are required for mounting the switch. The switch framework consisting of 3-in. by 4-in. angles, furnishes the necessary double arming for dead ending the lines on each side.

These switches are furnished with insulators rated at 22, 33, 44, 55 and 66,000 volts and all give a little more than two feet of clear separation between live parts when switches are in the open position. No auxiliary contacts are provided on the Type "D" line of switches to prevent blistering of the main contacts in case of opening with line current.

The special difficulties which this equipment was designed to overcome may be summarized as follows:

1. Striking between phases when opening.
2. Striking to ground when opening.
3. Contacts burning and welding so they cannot open.
4. Contacts freezing from ice so they cannot open.
5. Contacts freezing from ice so they cannot close.
6. Mechanical shock or blow to insulators causing breakage and failure of same.
7. Insulators often under torsion causing separation of units and failure.
8. Dependence on horns to carry arc upward and stretch to rupturing length.

A very noteworthy feature of both the Type "D" and "T" switches is what is known as the spring type of contact for the main current carrying capacity. These contacts are identical for all of the Type "T" and "D" switches rated from 22 to 66,000 volts and consist of a multiplicity of parallel spring wires each seating in a "V" notch in the other member of the contact and arranged to be bent back when in the closed position so as to exert a pressure against the notch. This insures a constant large carrying capacity by each one of these wires which under tests of 10 to 12 times their rating



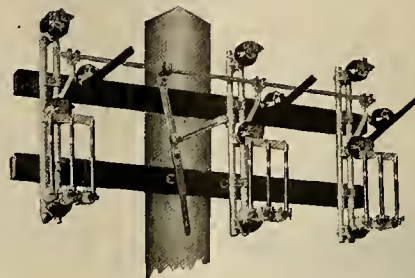
One leg of the Type "D" switch for 44,000-volt service, in open position. A double angle brace is provided for each stringer angle to give ample rigidity of construction.

have shown no injurious results. This contact was designed to meet the great demand for a contact which would stand up and continue to give satisfactory service under ice conditions, and would also not weld electrically and prevent opening. Good seating is insured by a wiping action.

On all of the Type "T" and "D" switches for voltages from 22 to 66,000 standard pin type insulators with $\frac{3}{4}$ -in. separable thimbles are used, and the insulator caps are held on by specially formed rings in the groove under which set screws in the cap are engaged, forcing the cap down rigidly on to the top petticoat of the insulator. The set screws exert no direct pressure against the porcelain.

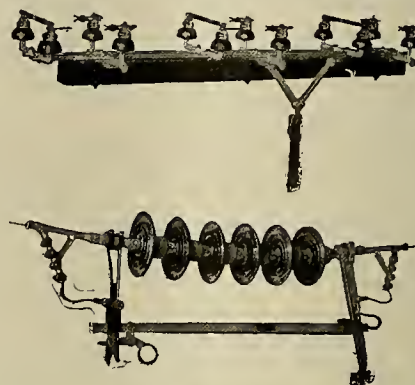
SPECIAL SWITCHES

Lines of specially designed switches with distinctive features are being advertised by the Pacific Electric Manufacturing Company of 827 Folsom street, San Francisco. One known as the Type 413 switch is equipped with self-renewing fuses, the lower ends of the fuses being separated by explo-



Type 413 switch, equipped with self-renewing fuses. The blowing of the fuse explodes a cartridge which cuts in the next fuse.

sive cartridges in such a way that the blowing of the fuse causes a gap discharge in the cartridge, exploding it and cutting in the next fuse. The switch is very powerful at the time of its travel when it is forcing the blade into or out of the contacts, having a toggle joint or minting press motion



Above is a group controlled, type 200 switch which has a control operated from the ground; below, the Pacific Strain Insulator Switch.

that makes the switch very easy to operate. The control can be installed, without change, on switches mounted vertically or horizontally.

Another, known as the Pacific Strain Insulator Switch, has wide flaring, self-aligning contact jaws, a positive latch which can only be released by the operator's handle and a wide based, well braced blade.

The chief feature of this switch is that the hinge and contact posts are mounted on cylindrical supports so that they can be moved apart or together to provide for sag or insulator irregularities, or can be rotated around the insulator center to adapt to any twist in the line. Another feature is the extension of the hinge post, on which is mounted a flat spring, limiting the travel of the blade and making it very much easier for the operator to start the closing motion. This feature is particularly valuable when the switch is approached from an awkward angle.

The Type 200 group controlled switch has a control operated from the ground. In operation, the fuse supporting portion of the switch is moved sideways, disconnecting it and making it possible to replace the fuses. The same control can be used with the switch mounted either vertically or horizontally. The switch has self-aligning contacts, and is heavily galvanized. Provision is made on the fixed bases to attach strain bobs or insulators.

Books and Bulletins

McGraw Central Station Directory

The 1919 edition of the McGraw Central Station Directory and Data Book contains about 875 pages of completely revised data on 6,000 lighting plants.

During the past year there have been some 22,000 changes in central station statistics, and no old list can be a substitute for the 1919 edition. In the state of Iowa, for instance, there is practically no company in which there have not been from one to a dozen or more changes since the previous list was published.

Eighteen thousand changes are recorded in name, capital, bonds, personnel, equipment, distribution system, price of fuel and city lighting contract.

Four hundred companies are listed for the first time.

Four thousand companies either retailing electrical appliances or doing electrical contracting (or both) are definitely indicated by symbols, for easy reference.

New and valuable features are figures on the number of meters in service; population reached, and kw. connected power load. The information is definite, vital, authoritative and complete—the useful kind of data that is practically indispensable to a company now doing business with or planning to reach the central stations. Neither labor nor expense has been spared to make the new volume the most comprehensive of its kind.

The Spotlight

An interesting notion in the way of publication is a small illustrated monthly called "The Spotlight," issued by the Inter-Mountain Electric Company of Salt Lake City, Utah,



This is the cover of the August number of the Spotlight—a monthly publication issued by an electrical company of Salt Lake City and sent out to dealers to keep them in touch with the newest devices in the electrical field.

and Pocatello, Idaho, and sent out to dealers in automobile accessories and electrical supplies. It contains various brief illustrated accounts of new devices, as well as general display advertising. In addition there are short articles on advertising and other features helpful to the retailer. For the enlivenment of the too serious-minded dealer a page at the end is devoted to anecdotes. The cover is executed in regular magazine style—the August 1919 design being shown in the illustration.

Electrical Testing Devices

The Western Electro-Mechanical Company of Oakland, California, have recently issued a small pamphlet describing their testing equipment for taking load surveys of both a.c. and d.c. networks, industrial plants, transformer or motor loads, etc., and their Form A Phantom Loads for meter test-

ing. The booklet contains some 22 pages, well printed and illustrated.

Graphic Meters for General Testing

In a recent number of the Graphic, issued each month by the Esterline Company of Indianapolis, the many advantages of instruments which write down their own records are pointed out.

Cash books have given way to cash registers; adding machines have taken the place of pencils and paper; the human element tends to be eliminated from all systems of records.

In no field is this more pronounced than in that of electrical testing. Here the quantities to be measured and recorded vary widely and rapidly from instant to instant; in many cases the rate and character of the fluctuations, as well as actual values, must be known, and the graphic, curve drawing instrument, which measures and records every value and variation, is rapidly replacing indicating instruments for general testing work.

The Esterline Company has compiled a booklet of graphic records showing the load characteristics of various industries and operations with an analysis of each curve.

The Best New Books

"The Booklist," issued monthly by the American Library Association Publishing Board, Chicago, is a reliable and helpful guide to the best new books in all fields of activity. Of interest, among those listed in the issue for July, 1919, is "Public Utility Rate Fixing" by C. E. Grunsky, recently published by the Technical Publishing Company.

Forestry Publications

The U. S. Department of Agriculture announces several publications relating to the forest problem, one of which is by William B. Greeley of the United States Forest Service. It is entitled "Some Public and Economic Aspects of the Lumber Industry"; it outlines the conditions which obtain in the lumber industry, discusses the returns on timber investments in lumber manufacture and in lumber distribution, analyzes the underlying causes of instability in the industry, and sets forth what the situation calls for. All the publications are available for free distribution.

"The Electrician"

The 1919 "Electrician," the Directory and Handbook of the Electrical Engineering and Allied Trades, published by Benn Brothers, Ltd., of 8 Bouverie Street, London, England, is the thirty-seventh of the annual issues.

Besides the extensive revision a number of improvements have been introduced, among them thumb-holes and tabs to facilitate reference.

The new issue contains about eighty pages more than the last one, all data having also been carefully brought up to date. It is a reliable and inclusive work of reference, and of great practical value to the electrical industry all over the world.

New Street Car and Window Cards

In addition to the other dealer's helps which the Cutler-Hammer Manufacturing Company of Milwaukee, Wis., has prepared for use in connection with the national advertising on the C-H 7050 Switch, they are now distributing two new four-color display cards. One shows an electric iron and cord with a young woman in the act of pushing the switch "on." The other carries a striking illustration of a toaster and cord equipped with one of the switches as part of a typical breakfast setting. Each has a prominent legend stating that "the buttons tell when the current is on or off." When used solely for street car advertising, these cards are imprinted with the dealer's name and address, and whenever they are desired for use as window or wall display cards, a suitable legend is imprinted in the space provided for the dealer's name and address.

NEW ELECTRICAL DEVELOPMENTS

(Municipal undertakings, both in power projects and city extensions and improvements are features of recent Northwest news. The Pacific Central District reports various important water applications and irrigation plans, and the Pacific Southwest, a number of reservoir plans. Reports of new installations and general items regarding public utility service come from the Intermountain District.—The Editor.)

THE PACIFIC NORTHWEST

ANACORTES, WASH.—The transfer of the water system from the Washington Power, Light & Water Company to the city of Anacortes, Wash., has been made.

GRANTS PASS, ORE.—The California-Oregon Power Company is arranging for a transmission line from Medford to Roseburg, where it is understood they will cut in with the Umpqua Power Company.

TACOMA, WASH.—The city lighting department of Tacoma is getting ready to install a 1500-kva. 3-phase outdoor type Allis-Chalmers transformer, to be used for supplying power to a considerable number of Allis-Chalmers motors at the sawmill of the St. Paul & Tacoma Lumber Company in the city.

PORTLAND, ORE.—A movement is on foot to bond the city of Portland for \$25,000,000 for the purpose of harnessing adjacent water powers and selling the power at cost to manufacturers. It is claimed that 3,000,000 horsepower tributary to Portland is going to waste.

BANDON, ORE.—The possibility of a municipal electric power plant for Bandon was discussed at a recent meeting of the city council and it was decided that the proposition warranted an investigation. It was arranged for the mayor, a number of councilmen and a committee of citizens to accompany an engineer on a trip to the Elk River country in northern Curry county for the purpose of looking over proposed sites.

SPOKANE, WASH.—Lewiston and Walla Walla men have incorporated the Electric Equipment Company, which has filed its articles in Spokane county. The company will do a general business in electrical light equipment and will have offices in Lewiston, Walla Walla and Colfax, and afterwards in Spokane. The incorporators are Bert Ferris and A. H. Cash of Lewiston, K. Harian and C. O. Hawkinson of Walla Walla and R. J. Cosman of Colfax. They have incorporated for \$25,000 capitalization.

SEATTLE, WASH.—Outlays aggregating the sum of \$459,800 for betterments of the city light and water plants were authorized by the city council Wednesday in connection with the preparation of the 1920 budget. The council also approved a budget estimate of \$1,520,335.50 for supplies in the light department against an appropriation of \$1,119,678 for the same purpose in the 1919 budget, and \$173,300 for supplies in the water department, against \$133,356.60 appropriated for the purpose in the 1919 budget.

TACOMA, WASH.—Tacoma's election on the Lake Cushman power site carried by a vote of 7,721 to 1,291. Action of the citizens gives the city council the right to complete negotiations for the purchase of the Lake Cushman power site together with the flowage rights, right-of-way to construct a power line from the site in Olympia to Tacoma, all present leases on the property itself from the Skykomish Power Co. and its allied interests, which have agreed to deliver the project in toto to the city for \$300,000.

SEATTLE, WASH.—Sealed bids will be received by H. W. Carroll, city controller, up to noon of September 27 for the purchase of \$1,250,000 municipal light and power plant and system bonds, the bonds to be in denominations of \$1,000 and dated October 1, 1919, interest not to exceed 6 per cent. A certified check upon

a national bank or trust company, or a cashier's check upon a national bank or trust company or a state bank within the city of Seattle, must be tendered for two per cent of the par value of the bonds.

EVERETT, WASH.—The first definite steps toward the acquisition of a municipally owned and controlled electric light, heat and power plant were taken by the city commissioners of Everett, Washington, when they instructed H. E. McDonnell of the firm of Burns & McDonnell, Kansas City, contracting engineers, to collect data regarding the local holdings of the Puget Sound Power Company. It is probable, in view of the investigations made, that a power plant proposition will be submitted to the voters at the November election and that from the data collected by the engineer some plan for financing the power plant proposition will be worked out.

SEATTLE, WASH.—An ordinance appropriating about \$432,000, which will be used in construction of power site road, sawmill, temporary electric plant and for the preparation of specifications and plans covering the Skagit project will be heard by the council. The finance committee has recommended passage of the ordinance. Mayor C. B. Fitzgerald of Seattle has recommended that development of the Skagit river power project by the city should be done under the direction of an engineer who has specialized in hydroelectric construction, holding that the city engineer has too much other business to look after to be able to devote the time required on a project as large as the Skagit.

ASTORIA, ORE.—The Pacific Power & Light Company has closed a deal for the purchase of a 15-acre tract of land on Young's Bay at Astoria, Oregon, on which it will soon begin construction of a large power, light and gas plant, according to announcement made by head officials of the company. Adequate energy for all purposes will be provided in the new power plant, and a system of distribution installed that will serve every branch of industry in the lower Columbia river project. The cost of the improvement is estimated at \$75,000 and includes a gas-making plant in conjunction with the electric power provided. Electric generators have been ordered in the East and a portion of the equipment is ready for shipment.

SEATTLE, WASH.—A further contribution to the power supply of Seattle was made recently by the interconnection of the transmission lines of the Puget Sound Traction Light & Power Company and those of the Intermountain Company, which links up the Washington Water Power and its great hydraulic plants of the east side with the hydroelectric plants of the Puget Sound Traction Light & Power Company. The Washington Water Power Company added 14,000 horsepower of machinery as a result of the electrification of the Milwaukee Railroad and the same amount of machinery was added to the plant of the Puget Sound Traction Light & Power Company for the same purpose. In the combined system are 1500 miles of transmission lines.

OLYMPIA, WASH.—Asserting that petitions for service under the proposed increased extension rates for lighting where consumers are not on an established line, are greatly in excess of the protests filed with the commission against the proposed new rates, the public service commission of Washington has rescinded the order suspending the tariff schedule recently filed by

the Puget Sound Traction Light & Power Company of Seattle. Under the proposed tariff the company will charge a minimum of \$2 a month for each customer where the extension requires one pole and \$3 a month where two poles are required. Two dollars a month each is charged where the two customers are on one extension requiring 2 poles. A minimum of \$1.50 is charged where only a service extension is required. Customers will be compelled to contract for service for a period of three years.

THE PACIFIC CENTRAL DISTRICT

MARYSVILLE, CAL.—A resolution formally approving the formation of the Cordua irrigation district has been passed by the board of Supervisors.

SONORA, CAL.—The Melones Mining Company is installing an electric plant, using the ditch water. Power will be sold to the Sonora and San Francisco Power Company.

AUBURN, CAL.—A committee has been appointed to ascertain the sentiment of the orchardists of Placer county regarding the formation of an irrigation district to embrace the entire county.

OAKDALE, CAL.—Notice of the intention of the Oakdale Irrigation District to proceed at once with the construction of the million and a half dollar reservoir at Melones was served recently upon the South San Joaquin Irrigation district.

PETALUMA, CAL.—The Petaluma-Santa Rosa Electric Railroad plans to extend its line from Forestville to the Walls-Ford bridge across the Russian River. The supplying of gravel at small cost for the new highways will no doubt be considered in the granting of the right of way.

CHICO, CAL.—J. W. Northedge was granted a franchise by the Board of Supervisors to operate an electric lighting plant in Richvale, the current to be supplied by the Pacific Gas & Electric Company and retailed to the consumer by Northedge. The system will be installed at once and will serve all parts of Richvale.

SAN MATEO, CAL.—A report published recently stating that the United Railroads electric line at San Mateo and the Peninsula Electric Railways at Palo Alto are to be connected by extending the tracks from San Mateo to Palo Alto was denied by Manager Chapin of the Peninsula Railways.

DUNSMUIR, CAL.—Arthur L. Coggins, of Dunsmuir, has made application to the State Water Commission for 300 cubic feet per second of the waters of Upper Sacramento River, in Box Canyon, Siskiyou county, for the generation of electrical energy, with storage of 17,000 acre-feet. The use to which water is to be applied is the sale of power and pumping water for irrigation in connection with this project. The cost of the proposed works is \$431,900.

MODESTO, CAL.—The proposition of the Modesto Gas Company to sell its street lighting Company in the city and convert it into an electrolier system was accepted by the city council on recommendation of Commissioner Cuneo of the council. Mayor George J. Ulrich, Commissioners Cuneo and Alvin Turner were named a committee to make and close the negotiations. The cost of lighting under the electric system will be about half, according to the figures presented to the council.

PORTERVILLE, CAL.—An important movement along the lines of irrigation was started for the eastern part of the county when the shareholders of the South Tule Independent Ditch Company voted to proceed with a plan looking to the ultimate impounding of the waters of the South Tule river. A committee consisting of Hobart Webster and Robert Horbade was appointed to ascertain the cost of the proposed project, and suitable sites for the dam.

PORTERVILLE, CAL.—Officials of the Central Counties Gas Company stated that bids have been received for the construction near the north city limits of a gas holder which will have a capacity of 125,000 cubic feet or more, sufficient to handle the demands of the consumers in Porterville in case of any interruption in the supply from the central plant in Visalia. It is stated there is to be no delay in letting the contract and that construction will be completed as rapidly as possible.

MODESTO, CAL.—After approval by the Modesto irrigation district board of the final report on the cost of the Don Pedro project, also of the power plant there, and of the enlargement of the main canal and drainage extension, the document was forwarded to the State Irrigation Bond Commission for approval, preliminary to the election for the issuance of bonds. The Turlock Irrigation District share of the Don Pedro cost will be twice that of the Modesto district. Both are to jointly build the project.

MARTINEZ, CAL.—Suit was filed by D. J. Hall of Richmond in which the people of the state of California are named as plaintiff against the San Francisco-Oakland Terminal Railroads to restrain that company from permitting electric current from its rails to pass through the earth and cause disintegration of metals anchored underneath the soil. A similar suit was filed against the railroad by the Standard Oil Company of Richmond several days ago. It is claimed that the trouble can be overcome by insulating the rails.

SAN FRANCISCO, CAL.—The State Water Commission has granted to the Sierra & San Francisco Power Company of San Francisco 150 cubic feet per second of the waters of the South Fork, Stanislaus River, for power purposes. The diversion dam is to be 11 feet high, 52 feet long on top and 46 feet long on the bottom, of masonry and concrete. Ditch and flume will be 4.63 miles' long. Water will be used for development of hydroelectric power, to be distributed by the applicant as a public service corporation. The estimated cost of the proposed works is \$740,000.

SAN FRANCISCO, CAL.—The application of E. A. Walters, Berkeley, Cal., for 400 cubic feet per second of the waters of Bucks and Grizzly Creeks, Plumas county, tributary to the North Fork Feather River, for generating electricity for power purposes, has been granted by the State Water Commission. Diversion works will consist of a masonry dam 10 feet high, 40 feet long on top and 20 feet long on the bottom, and a canal 10 miles long. The amount of water to be stored is 60,000 acre feet. The storage dam is to be 140 feet high, 300 feet long on top and 60 feet long on the bottom, of gravelly soil tightly compacted with concrete core. The estimated cost of the proposed works is \$4,000,000.

TURLOCK, CAL.—The construction department of the Turlock Irrigation District is preparing to spend about a quarter of a million dollars of the district's money in extensions and repairs during the off-season, or period when the water is out of the ditches. They will continue their operations until the water comes on again next March. One hundred and fifty men will be employed during most of this time. Some of the items on the program are: lining about six miles of canal with 785,000 sq. ft. of concrete at a cost of \$95,000; digging about 15 miles of drainage ditches at a cost of \$104,000; clearing out the main laterals and putting in

new structures, falls, etc., at a cost of \$26,000; enlarging a section of the main canal which takes water out of the river below the La Grange Dam, \$15,000.

THE PACIFIC SOUTHWEST

LOS ANGELES, CAL.—The Pacific Electric Company has been granted a franchise to construct and operate a single railroad track upon and across Central Avenue.

LOS ANGELES, CAL.—The Pacific Electric Railway Company has let the contract to Jay B. Harris for the construction of a brick, concrete and steel substation at 635 Maple Avenue for \$5,240.

LOS ANGELES, CAL.—Application has been made to the city council for a certain franchise granting the right to construct a double electric street railroad track along Maple avenue from 7th to 32nd street.

WHITTIER, CAL.—The Southern California Edison Company has been given a permit for the erection of a brick building 100 x 100 feet at the corner of Greenleaf and Penn, to be used for a shop and garage. The cost will be \$20,000.

SANTA FE, N. M.—The Springer-Colmor Irrigation and Land Company, W. H. Wolf, president, announces that the capacity of its reservoir will be increased to 26,000 feet, and arrangements made for irrigation of land under the Cary Act.

LANCASTER, CAL.—A special election has been called to vote on the formation of Los Angeles County Water District No. 4. The object is to secure land upon which to sink wells and erect necessary buildings. The bond issue is for \$250,000.

OWENSMOUTH, CAL.—San Fernando Reservoir No. 1 will be constructed, at a cost of \$150,000, to provide storage for about 2500 acre-feet of water. A wall 85 ft. high and 1,235 ft. long at the top will be constructed a mile west of the San Fernando reservoir.

TUCSON, ARIZ.—Construction work on the San Carlos dam will begin at once. A conference of 1500 Arizonians was held at Florence for the purpose of effecting a permanent organization. This dam will furnish water for the irrigation of 250,000 acres of land.

LOS ANGELES, CAL.—Pursuant to Article 19, Trust and Indenture dated Sept. 1, 1903, between the Los Angeles Pacific Railroad Company and the Los Angeles Trust & Savings Bank, to secure an issue of Los Angeles Pacific Railroad Company first and refunding mortgage 5 per cent gold bonds dated Sept. 1, 1903, the bank as trustee has invited tenders for sale to it of said bonds in an amount to the extent of moneys deposited in the sinking fund—\$9,286.81.

INDEPENDENCE, CAL.—P. C. Montgomery and C. H. Johnson of Independence have made application to the State Water Commission for 20 cubic feet per second of the waters of Little Pine Creek, Inyo county, tributary of Owens river, for generating power for a quartz mill, concentrators, etc. The diversion works consist of a concrete dam, and main pipe line 6.08 miles long. The amount of power to be developed is 726 t.h.p. The water is to be returned to Little Pine Creek after use. The estimated cost of the proposed works is \$30,000.

PASADENA, CAL.—When the city of Pasadena, which operates its own electric light and power plant, went outside the territory defined as the city of Pasadena and sold electric energy to the Raymond Hotel and other customers located in the city of South Pasadena it became as other public utilities, subject to the jurisdiction of the Railroad Commission. So declares the commission in an opinion handed down in the case of the Pacific Light and Power Corporation against the two Pasadenas. Accompanying the opinion is an order directing the city of Pasadena to immediately file with the Railroad Commission its schedule of rates.

THE INTER-MOUNTAIN DISTRICT

ST. ANTHONY, IDA.—City officials are seriously considering the installation of a white way street lighting system for the business district.

FIRTH, IDAHO.—The people of this community are making an effort to secure electric service from the Utah Power & Light Company.

BOISE, IDA.—Fire broke out recently in the power house of the Idaho state penitentiary and caused damage to the power house estimated to be between \$800 and \$900.

BOISE, IDA.—The State Board of Equalization has decided to increase the assessed valuation of the public utilities in this state on account of the necessity of increasing revenue.

LOGAN, UTAH.—The Utah Power & Light Company has made application to the State Engineer for permission to divert 125 second feet of water from Logan River for power purposes.

LOGAN, UTAH.—This city is advertising for bids covering the installation of a rather elaborate street lighting system for the business district, to consist of one hundred and twenty lamps.

PRESTON, IDA.—The Utah Light & Power Co. has been granted its application for permission to remove a certain line of poles, and to replace the same by a transmission line supported on 55-foot wooden poles.

FOUNTAIN GREEN, UTAH.—Permission has been granted to the Big Springs Electric Company of this city to install a meter system in connection with its lighting plant, by order of the Public Utilities Commission.

BOISE, IDA.—The Public Utilities Commission has just issued an order granting permission to the Utah Power & Light Company to widen the scope of its operations in Idaho. Construction work has been greatly restricted during the period of the war.

PAROWAN, UTAH.—Application has been made by the municipal plant to the Public Utilities Commission for permission to cut out flat rate service and to raise the electric lighting rate from seven to nine cents per kilowatt hour. No action has been taken by the Commission.

AMERICAN FALLS, IDA.—Preliminary surveys by government engineers are under way with a view to the erection of an immense impounding dam in the Snake river between the Oregon Short Line Railway bridge and the wagon highway bridge. The dam will furnish irrigation for approximately 600,000 acres of land and will cost \$20,000,000.

IDAHO FALLS, IDA.—On account of the drought with resulting low water the Idaho Falls municipal plant was compelled to shut down recently. The citizens were without electric service for several days. Arrangements were finally made with the Utah Power & Light Company for current to supply the city until the plant can again be operated.

SANDPOINT, IDA.—A contract has been closed with the Calispell Light & Power Company, Dalkena, Wash. (which purchases electric current from the Sandpoint division of Mountain States Power Company), covering 40 horsepower in motors for the Dalkena Lumber Company, with prospects of an additional 100 horsepower. All reports indicate that the lumber companies in this district are increasing capacities and have acquired timber enough to keep them running several years.

KALISPELL, MONT.—Several electric pumps have been installed by the Kalispell division of the Mountain States Power Company for ranchers in the vicinity of Kalispell—one 40 horsepower, another 15 horsepower and one 7½ horsepower—with prospects for several more. Requests for new extensions are being made in the town of Whitefish, which is served by the Mountain States Company, and the Great Northern Railway at this point is negotiating with the company for power to operate part of its shops.

THE VACUUM CLEANER

THE VACUUM CLEANER

KEEPING SCRAP PAPER for thirty days before destroying it is the practice of one bank reported elsewhere in these pages. There are apt to be checks and other valuables lost otherwise. This page is the substitute for that practice. In order that the many valuable odds and ends which flutter about the editorial rooms, and are so likely to find their way into the waste basket, may not be mistaken for scrap paper and destroyed, they are carefully sorted out and presented here in an array of miscellaneous interest under the supervision of that electrical janitor, the Office Vacuum Cleaner.—The Editor.



The Welshrarebit and not Professor Bliss' course must be held responsible for the following nightmare which recently arrived anonymously in the editor's mail:

THE ELECTRICAL STUDENT'S NIGHTMARE
(After combining Professor Bliss and Welsh rarebit)

Two huge and hungry dynamos
Are crouching in the gloom
While swarms of little kilowatts
Go crawling 'round the room.

I step upon resistance coils
That twine around my feet,
While gloatingly on every wall
The ampere meters mete.

A volt leaps on the bed and shrieks
"D.c.! a.c.! d.c.!"
And while I stop my ears he hurls
A pile of ohms on me.

I struggle out and try to run
But find my leaden feet
Are wired up in series with
A stove across the street.

A little bit of lovin' is recommended as a cure for failure of all sorts in this worth-while bit of poetry. It is by Houston Post and it appeared in the P. T. Magazine.

If you put a little lovin' into all the work you do,
And a little bit of gladness, and a little bit of you,
And a little bit of sweetness, and a little bit of song,
Not a day will seem too toilsome; not a day will seem too long;
And your work will be attractive, and the world will stop to look,

And the world will see a sweetness, like the tinkling of a brook,
In the finished job; and then the world will turn to look at you
With a world's appreciation of the thing you've found to do.

Just a little bit of lovin', and a little bit of song,
And some pride to sort of make it straight and true and clear
and strong;

And the work that you're a-doin', pretty near before you know,
Will have set the world a-talkin', and the little winds that blow
Will bring echoes of it to you, and you'll see that you have done
More than you had dreamed or hoped for when the task was
first begun.

And you'll find the bit of lovin' you have put into the same
Has come back to you in lovin', and come back to you in fame.

HOUSTON POST.

A Japanese janitor, employed at one of the Pacific Telephone and Telegraph Company exchanges in Southern California, in the following communication addressed to his superior, thus details the disappearance of a broom and expresses his desire for another:

Mr. Johnson: I ask for you, the janitor has one broom, and last Monday day time some man take out, you know who do it is? And I must use to every night. Please for me one broom.

G. OWARA.

The Old Days are supposed to be the golden days, but there are some few things which modern science has improved. One of them is the telephone service. Here is an account of the original telephone exchange in Spokane which was installed in 1888, told by one of the operators of those days as it was reported in the Spokane Chronicle:

There was one main operating room where the telephone girls sat before a switchboard of fifty subscribers. Things weren't as nice then as they are now. Everything was crude and there was much more work for the operator of those days than for the operators of today. When we wished to call a number we used to have to push a button with one finger and at the same time turn a crank with the other hand. Then if a party wanted a number, a little blind over the number of the party signaling would drop down, showing the number calling.

Our work was much lightened, however, by the manner in which the people of the town treated us, always showing us every consideration. Whenever the store owners wanted to make a number of calls in succession they always appreciated the trouble it was for us and sent us a box of oranges, or candy. Every one knew every one else in the town at that time and consequently we always knew who was asking for a party. And though we had telephone numbers in those days they were hardly ever used. If John Jones wanted to call Henry Smith, whose number was "24," he never asked for the number, but simply requested that we ring Henry. And before any one ever called a number he would usually chat for a while with the telephone girl, asking about the folks at home, the garden, and the new family that had just arrived in town. Then when the talk was finished he would call his party. It was just like home then.

"Be pleasant until ten o'clock in the morning," says one electrical man, "and the rest of the day will take care of itself."

The hard road of the meter reader is just beginning. You have heard of the company's meter man who reported twenty-five houses on his rounds which had all the doors to the cellar locked and the key in the personal pocket of the man of the house. Well, here is another one of the little incidents which make his life worth living:

Man at door: "I'd like to see the meter."

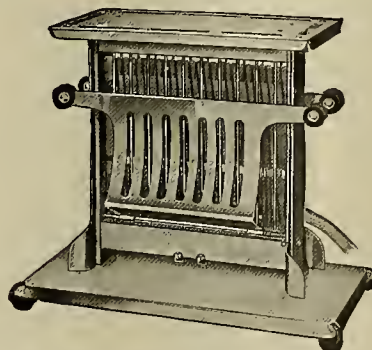
Housewife: "Well, it's pretty busy, but I suppose you can see it for a moment."

What would you do in answer to this letter which is passed on by the Western Electric Company? One of their installers writes them to say:

"The attached material was lost. Please sent it as soon as possible."

Apparently the material really was lost, for there was nothing attached to the communication.

FOOLISH SELLING ARGUMENTS—II



When making an after dinner speech, the best way to make your toast warm, crisp and attractive is to use an ELECTRIC TOASTER.

JOURNAL OF ELECTRICITY

VOL 43 NO. 7

SAN FRANCISCO, OCTOBER 1, 1919

PER COPY, 25 CENTS

2

THE SATURDAY EVENING POST

October 4, 1919

Hotpoint

You might select the word
characterize your Hotpoint
On the other hand
comfort which
Or, you
ever

EDISON ELECTRIC APPLIANCE CO. INC.

Hotpoint **Edison** **Hughes**

NEW YORK 111 WEAVER PLACE
5660 WEST TAYLOR STREET
CHICAGO, ILL.
September 1st, 1919.

ATLANTA
SAN FRANCISCO
ONTARIO
CALIFORNIA

ADDRESS ALL COMMUNICATIONS TO THE COMPANY
A DIVISION OF THE WEST

TO OUR HOTPOINT CUSTOMERS:

The outlook in every line of business for the Fall and Holiday season is especially bright. In fact, many feel it even surpasses the hoped for condition predicted by the most optimistic. The brisk market conditions of the last 30 days indicate very clearly the confidence in this situation of almost every line of business activity.

This condition has thrown a very heavy burden upon the electrical manufacturer. Almost over night, we have been called upon to double, and in some cases even treble our output to take care of this unusual demand. It is difficult to meet a sudden increased demand such as this, because it takes time to secure quantities of raw material. Skilled help cannot be quickly obtained because of the uncertain labor market.

Contrast with this situation the haberdasher who ordered his Fall hats last Spring, and the shoe merchant who has had his order for footwear in for eight or nine months. The manufacturers of these lines have six months or more to take care of these orders.

We, however, anticipated, to as great an extent as possible, this critical situation, and have made every possible plan to take care of our Fall and Holiday trade, and thus give our customers the best possible service.

I suggest that you canvass this situation very carefully. If you have not put in your order for Hotpoint Appliances--send it to your jobber NOW. The slogan "Do Your Christmas Shopping Early" will be more prominently used this year than ever before. Will your stock of Hotpoints be in shape to take advantage of this early trade?

Our advertising for the Fall and Holidays will be continued, of course. We take pleasure in sending you a reproduction of our October Post "ad". These will be followed by two more beautiful advertisements - a two color center spread in the Post on Nov. 29th and a four color insert in the December Ladies' Home Journal. These will increase the already marked demand for Hotpoint Appliances.

Coupled with this, we will soon have a very attractive window display for the Holidays and a complete and extremely attractive line of co-operative helps.

So order your stock NOW.

Yours very truly,
W. A. Hughes
PRESIDENT.

SEE OUR EXHIBIT
CHICAGO
ELECTRICAL SHOW
COLISEUM
OCTOBER 11-25, 1919

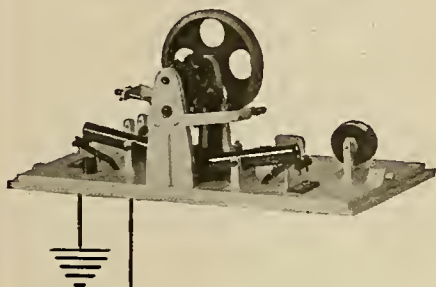
Edison E
New York
Manufacturers
Among the thousands of
one near you who will glad
Or write our nearest office

EDISON ELECTRIC APPLIANCE CO. INC.
CHICAGO
NEW YORK **ONTARIO, CALIF.** **ATLANTA**

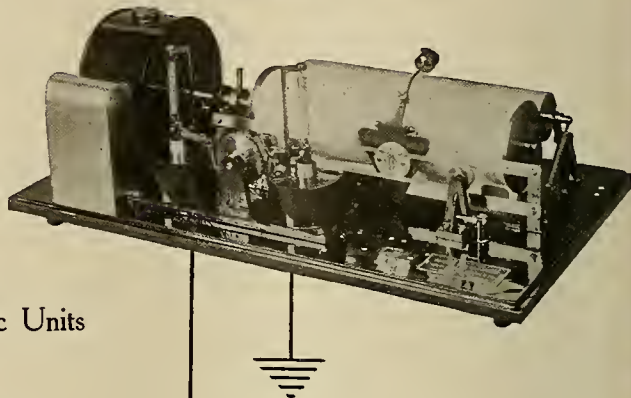
Stevens Long Distance Water Stage Recorders and Indicators

Let Stevens Recorders Plot your Hydrographs

Place this over the water



Place this in your office



Records
every
change
of
levels

English or Metric Units

Requires only
one Wire

Long Distance
Duplex and Differential
Recorders
and
Indicators

Direct float operated
Recorders

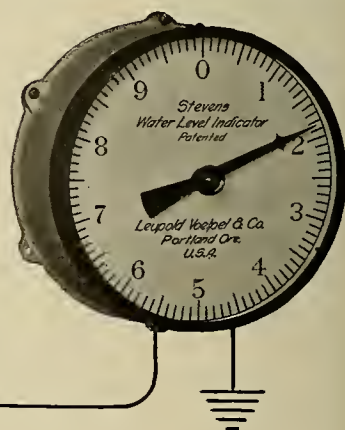
Type A runs from
one to six months
with one setting

Type E low priced,
8-day, dust and fool
proof

Duplex and Differential
Recorders

Any number of
Recorders or Indicators
in parallel

Mount this on switchboard



Can be operated
on
telephone
lines

Write for Details and Prices

Leupold, Voelpel & Co.

Manufacturers of Scientific Instruments

Portland, Oregon, U. S. A.

JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

VOLUME 43

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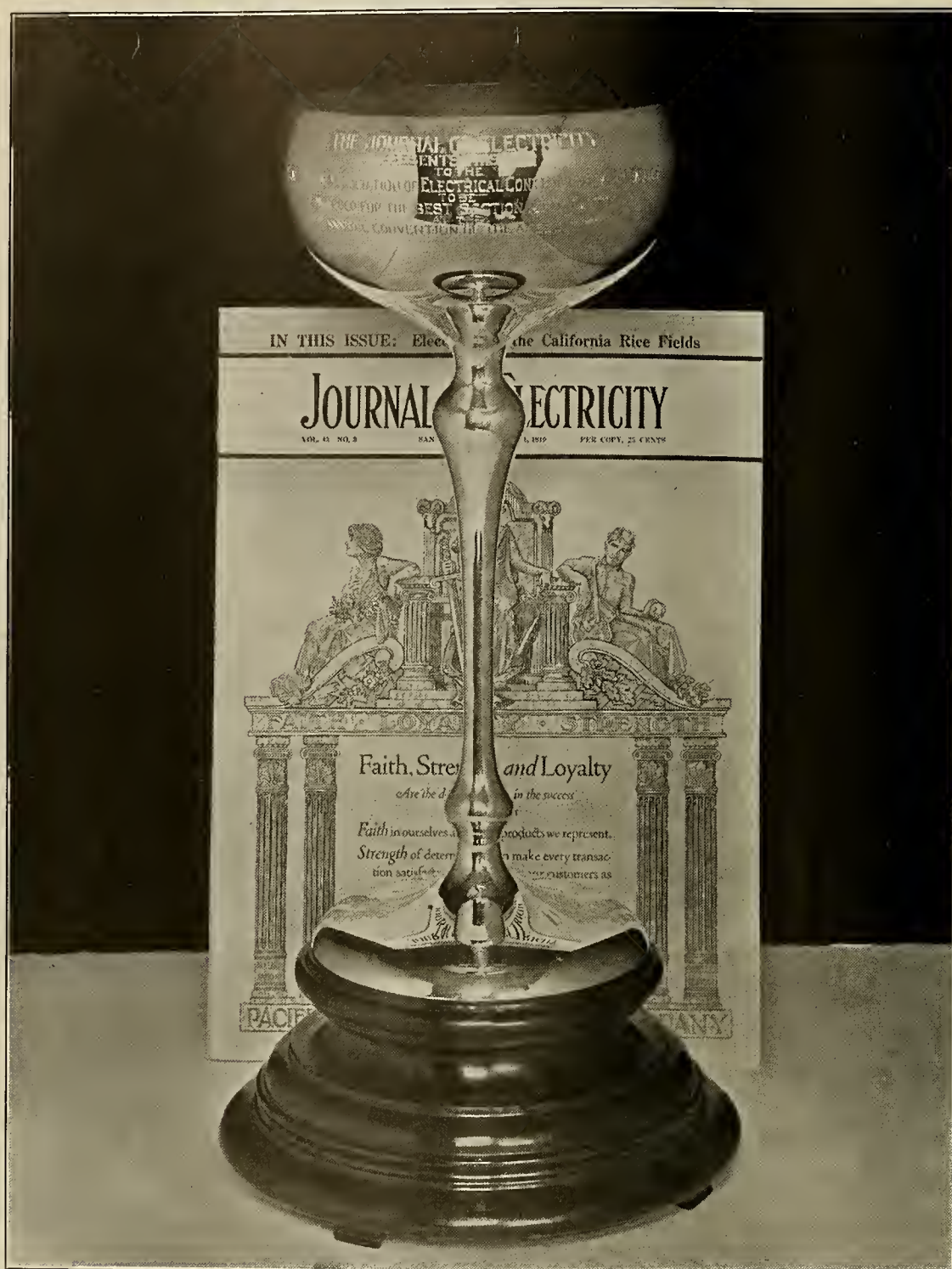
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President & General Manager

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Vice-President & Editor

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Secretary



THE Journal of Electricity believes in the Convention idea. It believes in the cooperation fostered by mutual understanding which grows out of these gatherings of men working along similar lines. In encouragement of this constructive factor in the electrical West, the Journal of Electricity has offered this beautiful cup to be awarded at each annual convention of the California Association of Electrical Contractors and Dealers for the best section or district attendance at the convention. At the recent quarterly meeting of the Association the initial award of the cup was made to the Modesto district for a record attendance at Santa Cruz. It is hoped that this concrete embodiment of the ideal of cooperation may help to bring about even wider personal contact among the contractor-dealers of California and a closer working together of all forces for the betterment of the industry.



JOURNAL OF ELECTRICITY



DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43

SAN FRANCISCO, OCTOBER 1, 1919

Number 7

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RAMPANT sinister forces, more subtle and more powerful for harm than the hordes recently arrayed against the allied nations of the world, now confront them in industry, on the farm, in the home, even in the legislative halls of the people. These forces may be personified as six strong devils—suspicion; fear of unemployment; industrial agitation; extremist propaganda; economic fallacy; unfair division of profits and products. You are a part of the great fabric that holds the social order together. What are you personally—individually—doing to keep your consciousness clear from the machinations of these destructive demons? How are you aiding the world at large to advance; helping with your own clear thought, your utmost sympathetic effort in behalf of humankind?

A forceful factor has been added to the California Electrical Cooperative Campaign by the institution of the Salesmen's Auxiliary. This plan, as outlined elsewhere in the present issue, involves the appointing of select committees of salesmen in the chief distributing centers, commissioned to go forth as mobile missionaries of good business.

The new activity supplements the labors of other agencies. The seven members of the campaign committee have worked well and wisely; the three field agents have carried into execution the program as it has developed. The Journal of Electricity and Electrical Merchandising have furthered with utmost zeal the progress of the cooperative movement. Yet the spoken word is a potent influence where perhaps the printed word might pass unnoted. It is a master stroke thus to secure for the campaign an auxiliary committee of 50 better-business gossellers, glad to voice the message formulated by the leaders.

This new policy insures an intimate knowledge by all of these active salesmen of the principles underlying the campaign. That alone is a vast gain. Moreover, through their explicit appointment a duty has been skilfully imposed upon these men, and is cheerfully accepted.

This will prove an ingenious device for securing the best work to prosper the cause. The thing has been done in an unusual way. All salesmen might have been casually appointed an auxiliary "committee of the whole," but such general commissions appear always to be only half-heeded. They carry slight sense of responsibility of accomplishment. What was needed was what was done—specific appointment, designation by titles. Justly does this

forward movement in the electrical trade merit to be called a campaign, for it is being carried on with military precision and all the finesse of strategy.

It is an astonishing thing that it has become necessary seriously to discuss the question of whether the engineering profession shall join in the labor union movement. The formation of union groups among engineering draftsmen is contemplated—has, indeed, already taken place in such instances as among the employees of the Board of Public Works of San Francisco. When it is considered that many engineers start as draftsmen, the drift of this tendency is apparent. The question has been brought up more openly, moreover, by certain of the more radical element among the engineers themselves.

Although, of course, there is little likelihood that this radical departure will make extensive headway among the engineering group, it is but one phase of the demand for a recognition of the personal needs of the engineer which is a growing force in engineering circles today. The new organization which calls itself the American Association of Engineers is in some measure an attempt to meet the same need through channels felt to be more appropriate to professional standards.

The purposes of the movement are natural and wholesome, and were it not that it comes as a competitor to the great national societies already existing, it would be generally welcomed among forward looking engineers. However it seems possible that the need may be met through the present plans of vitalizing the national societies. Joint Councils of Engineering Societies have already met various local

situations in the West. There is a plan on foot in California for a State Council of Engineers and a probable extension of the cooperative idea on a nation-wide scale.

The situation is one which must be acknowledged. The engineer in the subordinate position has felt himself neglected by the engineering organization of the old type and has started a group of his own with the avowed purpose of bettering his position financially where he is underpaid, of helping to get himself a new position if nothing else is to be done about it and of bettering the cooperation between engineers and their standing as citizens, irrespective of their specialized branch of training. Either the present national societies must answer this demand of the younger engineer in some adequate way of their own or they must be content to acknowledge the new organization and turn over to it such personal functions as they do not care to handle.

It is interesting and refreshing to note the thorough manner in which I. W. Alexander, chairman of the Publicity Committee of the Pacific Coast Section, N. E. L. A., is coordinating all the various channels of expression leading toward effective publicity in matters affecting the electrical industry. Under his proposed scheme the publicity personnel of the Pacific Coast Section N. E. L. A., the California Electrical Cooperative Campaign, the various electrical development leagues and the publicity representatives of power companies, all work in a coordinated effort in putting over, with minimum lost motion, the message of the electrical industry to the public at large.

With publicity an avowed aim of the electrical industry, it becomes interesting also to review the ordinary activities of its various branches to see if the most in public good will is being obtained from the material at hand. It is inspiring, of course, to plan for the day when Sunday papers shall contain an eight-page Electrical Section, but in the meantime, secretaries of electrical organizations are too often neglecting the opportunity of reporting meetings, effective utterances of speakers and significant action by their groups to the daily press. Individual companies are perhaps less lax in this respect, but on the whole their news is usually of lesser importance. The knowledge on the part of the public that wide awake organizations are back of the electrical industry, that a high standard of ethics is maintained, that the service which they so casually receive over the counter or at the end of the wire is the product of most careful planning, will do much toward securing the public's good will.

Such news items are obtained only by sending the announcement or report of a meeting in to the paper in question—there is no reporter sent out to such gatherings to collect the news. Other organizations obtain much publicity in this way—watch the paper and you will see announcements of no greater importance than what you may have to communicate.

The value of such incidental publicity should be recognized and a committee or individual should be appointed in every electrical organization to follow it up. It is the first step toward the special Electrical News Section.

Anyone who has been in the western mountains during the latter part of this summer is acutely aware of the scarcity of water for both irrigation and hydro-electric use. Mountains usually white are bare of snow, glaciers are exposed and developing great fissures, rivers pitifully low, and several streams already dried up. Owing to the generous water of the spring period, storage conditions are slightly better than at this time last year, but the increased demands more than offset this advantage.

The California Railroad Commission has undertaken a survey of conditions to avert the threatened hydroelectric shortage in that state by suggesting needed improvements and additions to existing facilities. The Tulare County Board of Trade called a conference for Sept. 5th and 6th of all interests to consider the problem of increasing irrigation supplies in the San Joaquin Valley, in which the various power companies were invited to participate.

In the case of the power company the solution is largely one of adequate storage, as well as the company interchange of power to meet peak needs and the consequent more complete utilization of available resources. It is interesting to note that a second remedy has been suggested to meet the irrigation need which proposes a new power load of no mean importance. This is the drainage through pumping of water-logged, over-irrigated lands and the re-use of the water where needed. This policy has already been adopted to a great extent in southern California, with the excellent result of reclaiming the lowlands and furnishing the wherewithal to extend irrigation to lands not yet cultivated. Its extension to the more northern irrigated regions is simply a matter of time and the acuteness of the need offsetting the expense involved.

The government has adopted the slogan of "Buy Now — but Buy Wisely" for its Thrift Campaign. Both bits of advice are needed in the present frame of the public mind—and the adoption of both is necessary for the fullest acceptance of the electric idea.

A large amount of money was put into circulation through war channels and found its way into the hands of people unaccustomed to prosperity. These people are today in a position to spend and that they are spending for clothes and automobiles and the like is testified to by the prosperity of department stores and the inability of automobile manufacturers to keep up with the demand. On the other hand prices have risen enormously, far above the reaction of the ordinary salary to their stimulus—and in consequence another portion of the population is vitally concerned with the problem of how to meet expenses

Incidental Publicity

Water Shortage an Electrical Opportunity

The New Standard of Living

by cutting down expenditures. This perhaps is the portion most characteristic of the times.

The average family has a little less food on its table or food a little less rich, makes somewhat fewer purchases of books, goes to the theater fewer times, though oftener to the movies, gets along without a servant. In a way the standard of living has been slightly lowered. But in many respects the change is merely a substitution. If washing is done at home, it is done with an electric washing machine; if there is no servant, there is an electric toaster and a vacuum cleaner. The way of progress is to a great extent the way of economy. The typical family of the future may live simply and do its own work, but it will be supplied with electrical conveniences of every sort. The government has seized upon a profound truth in preaching that true thrift lies in wise expenditure—it is not money we get from life, but its fullest equivalent in satisfaction. The application of this theory will result in the wider use of electricity along every line of human activity.

The American electrical industry has become a tremendous civilizing and energizing force in all the lands bordering the Pacific. The time is at hand when it may fairly be stated that the stage of advancement attained by the various peoples of this area can be judged by their annual import of mazda lamps.

American electrical engineers are taking a leading part in the upbuilding of the industrial prosperity of this vast commercial realm. They find much that inspires them in the awakening of the Orient to power resources that have lain dormant for long centuries; they perceive in the three-thousand-mile rampart of the Andes hydroelectric potentialities comparable to those of our own Sierras and Rocky Mountains. Theirs is the skill that shall harness the horsepower of Alaska's storming torrents; through their ingenuity the floods of the Yang-tze gorge shall be made to serve the power needs of new China.

American manufacturers are everywhere profiting by this development. Last fiscal year the United States exported electrical machinery and appliances valued at more than \$80,000,000, and no small share of this trade was with Pan-Pacific lands. To the Philippines, for instance, we sent out \$1,500,000 worth of electrical material; to Hawaii, \$850,000; Alaska, \$400,000.

The possibilities for vast expansion of trade in Pacific lands have aroused wide interest throughout the electrical industry. The men of the American West, in particular, are to enter energetically into this field of enterprise. With them, and for them, the Journal of Electricity is making a consistent study of trade conditions in the Pan-Pacific area. The coming year, with the National Foreign Trade Congress in San Francisco, and the Pan-Pacific Engineering Conference near Batavia, Java, promises much of value to the industry. To prepare the way, so that we may gain full benefit from these conventions, the Journal of Electricity is to continue its investigation of electrical development in the Orient

and Latin America, and the issue of November 1st is to be a special World Trade number.

One of the greatest outstanding developments in presenting the message of the electrical industry to the people of the West is embodied in the proposal made by A. E. Wishon, assistant general manager of the San Joaquin Light and Power Corporation and president of the Pacific Coast Section, N. E. L. A.

Mr. Wishon, while recognizing the vast value of general publicity in the past, to meet present-day needs advocates a very definite campaign of education among all the individuals and concerns which utilize, or ought to utilize, electrical energy. His progressive plan involves the preparation of actual figures, in dollars and cents, showing how new hydroelectric development will help each element in the community—the farmer, lumberman, architect, manufacturer, and so on, through all the system of modern industry. Even a maker of overalls, to whom he communicated his ideas, proved with paper and pencil how he could sell 1000 dozen pairs of overalls in addition to his present sales within a certain San Joaquin Valley territory, if proposed hydroelectric development were carried through. The entire network of business affairs is immensely benefited by such new projects; and what Mr. Wishon proposes now is to show each element just how much it is directly benefited, so that it will clamor for the production of greater hydroelectric power in the West.

Once more, through the forward-looking thought of one of its industrial leaders, the West is pointing the way toward a notable advance—a progression from the general to the specific in publicity, with a common-sense appeal to the pocketbook.

New Journal Service

PLANS FOR THE COMING MONTH
INCLUDE

OCTOBER 15.....Special Salesman's Issue

Beginning the "Public Policy" series by S. M. Kennedy. Also articles covering every aspect of the salesman's problem.

NOVEMBER 1.....Pan-Pacific Issue

We are so proud of this number of the Journal of Electricity that we are sending it to every corner of the Pan-Pacific field, beyond even our regular circulation list.

WATCH FOR

BOOKKEEPING FOR THE ELECTRICAL STORE
by J. H. Walker

CONTRACTING PRACTICE
by Louis Etshokin

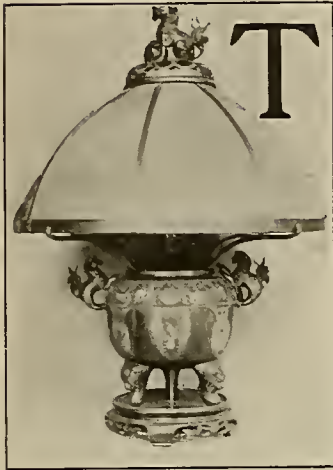
A COMMON COMMERCIAL LANGUAGE
by W. R. Daingerfield

THE NEW PHYSICS
by A. C. Crehore

Just Jones Starts an Electrical Store

BY J. H. MOSELEY

(Originality as a business asset for the electrical contractor-dealer is the keynote of this intimate sketch of the successful sales career of "Just Jones." The author, J. H. Moseley, formerly with the advertising department of the Western Electric Company, is now with the American International Corporation, export organization, as New York manager of the G. Amsinck & Company of Mexico. Mr. Moseley's progressive ideas on merchandising call for close consideration.—The Editor.)



TODAY, I, John Jones, a contractor, who am a practical electrician, and who, during my lifetime, have done some little work connected with retail selling, have decided to open up a store in a town in California. I am not only going to go after the wiring and fixture business, but I am going to make a try for industrial business and especially am going after the big volume of household appliance business, which is growing every day by leaps and bounds.

How shall I start? How am I to begin with a small capital and build up a good-sized business, through advertising?

Jones Selects the Best Location

Since I must have a place of business, the first consideration is the location of my retail store. The two factors involved are (1) rent, and (2) accessibility.

I shall pay as much rent as I can afford, based on a certain estimated volume of business. Having determined my maximum rent figure, I shall pick out the most accessible location I can secure for this amount of money.

In choosing a location it is a good idea to take a plot of the town, regardless of the size, and determine on which side or in which portion of this town are the greatest number of prospective customers. Furthermore, which side of the town is most likely to grow fastest.

Having decided this, the question of location is half solved. The problem can be limited still further by dividing that half of the town selected into two parts. This will give a small sector of the business portion in which I shall try to locate. In what part of this section shall I try to secure a place? If my rent allows, I shall select a place near a moving picture show, a successful confectionery store, or any other prominent concern which advertises liberally.

A location near a moving picture show is good on account of the ability to make night window displays to a good audience.

Let's assume I have secured a location near a moving picture show. The next question is, what shall I call myself and how should I make my store stand out as the most prominent one on the block?

Jones is a plain name, so suppose I decide to have my firm name "Just Jones." This can be interpreted in two ways; first, as meaning just ordinary,

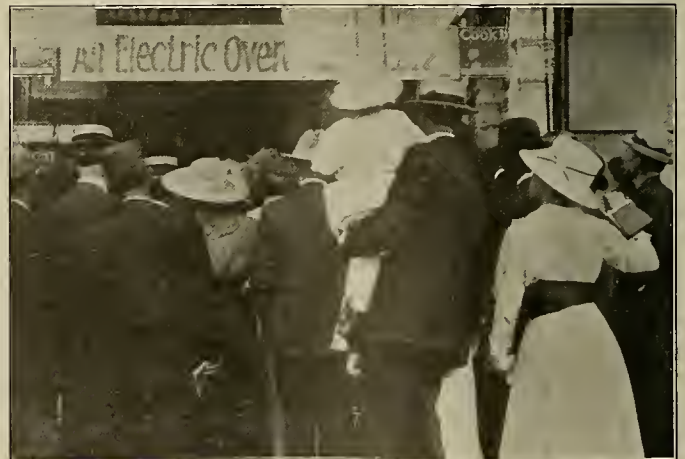
plain Jones; and second, as meaning "Just" Jones, giving the idea that I am absolutely just in all my dealings. It would be different from the ordinary name of "Jones Electrical Company" and would have an individuality to it.

Now, the chances are that my neighbors in a town of the size mentioned would have rather elaborately decorated window signs, consequently in order to get contrast, suppose I simply letter "Just Jones" in two or three-inch gold letters on the window glass either side of my door, paint the store front a prominent color to contrast with the others in the block and have made up a neat electrically-lighted sign with the name "Just Jones" on it.

I will, of course, want to use the same name on my envelopes, letterheads and billheads; and by all means these should be printed in the same kind of type as that used on the show window and electric sign.

I am now ready to open my store and put my wares before the public.

The ordinary merchant would probably insert a full page ad in the newspaper and possibly send out



A good location is all-important. If nobody passes your store you can't draw a crowd. Having secured the location, fix up a window display that will make everyone late for work.

circular letters to a selected list of friends. Consequently, in order to be individual, I shall secure some special yellow envelopes with my imprint thereon, these envelopes to resemble as much as possible the ordinary telegraph envelope. The inserted message might have the same heading, and read like a telegram.

In the lower left-hand corner on the message sheet should appear a small illustration showing a plot of several blocks of the town, with an arrow pointing to Jones' location.

If this message is printed in the same manner in two or three issues of the local paper, the chances are that the combined publicity will result in quite a few people visiting my store during the opening week. From these visitors a considerable number of leads should be obtained, to be followed up later by a salesman.

The Daily Drive for Business

I have now opened my store and am ready to start a hard every-day drive for business.

Here are the kinds of business I am going after:

1. Home wiring and fixtures.
2. Commercial wiring and fixtures.
3. Industrial wiring and motors.
4. Lamps.
5. Household appliances.

Home Wiring and Fixtures.—Where does this class of business originate? There are two classes of buildings on which to work:

1. New buildings.
2. Existing buildings.

Contracts with new homes can be made best through:

The Real Estate Man,
The Architect,
The Contractor and Builder,
The City Building Permit Records.

Now, where shall I start in order to get this business?

His House in Order—Electrically

Without a question the first place to start is at my own home. My home should have everything in the way of modern wiring and fixtures, so that I can actually show prospective customers the utility of having receptacles in the proper places, and the decorative effect of having the right kind of fixtures.

If, through force of circumstances and lack of capital, I cannot equip my home in this manner to start with, then I shall pick out several prominent

homes in the city and work very hard on them until they are equipped in a proper manner. I then shall have examples through which to sell my other customers.

The best kind of advertising, and that which makes the greatest impression, is the citation of particular and specific facts. For example, when I have finished up a particularly nice job of house wiring and fixture installation, here is a chance to send a circular letter to my entire mailing list of real estate men, architects, builders, etc., calling attention to the fact that the house in question has just been wired and illuminated by me and suggesting that they go around and see it at the first opportunity.

Existing homes which offer prospect of new fixture installations and changes in wiring can gradually be listed for use in the manner suggested above.

Another opportunity of keeping in contact with such prospects is to send them a short letter, notifying them of the receipt of new fixtures, attaching if possible a circular illustrating the fixture in question.

Almost everybody is glad to keep pace with the times and will appreciate attention. Such letters may not result in actual orders at the time, but eventually they are going to have the desired effect. I will not send out a letter unless I have something to say. This is a simple rule which if followed will surely bring success.

Commercial Wiring and Fixtures Next

Where shall I start on my commercial wiring and fixture business?

Once more it is necessary to have an example to start with, and my own store is the best example I can have.

It might be a good idea to design the fixture plan of my own store so that it can be changed occasionally, looking new and up-to-date at all times.

It will be easy to build up a mailing list of all the stores in town needing re-designed fixture in-



Advertising, like charity, should begin at home. You can't expect to convince your customers that they need electrical kitchens if your wife cooks on a coal stove. The modern equipment in your home should be such that your friends will talk about it.

stallations. Here again the mailing list will come into use every time I re-design the fixture installation in any store, or wire a new store.

When I fix a new show window for some one, I shall work to get as attractive a display as possible, and it might be advisable in such cases to actually check up the number of people passing and the number who look in, using this data in a letter to other prospects.

Following Up Industrial Prospects

Prospects for industrial wiring and motors can also be built up into a mailing list. This mailing list can be utilized in a manner similar to the other mailing lists noted above. While such a list may not contain, for a small town, more than 10 to 50 names, nevertheless it will be worth while to have it.

The best way to start this business successfully is to start a service system for taking care of the motors already installed in the neighborhood. This might be called "Just Jones Motor Service," and would consist of the cleaning and oiling of all motors of a customer once a month for a stipulated sum.

This sum must be set for each customer and should be sufficient to cover the cost of doing the work, the cost of the oil, and a small profit.

I will find that the leads obtained from a service of this kind will be of great value, because by monthly contact I am sure to know when a man is contemplating the installation of an additional equipment.

In making my bid on this equipment I can well afford to include service for a period of six months

or a year. This would be a strong factor in fighting competition.

The moving picture shows perhaps lead most businesses in the way of exterior illumination, consequently here is a place to start for lamp business.

Other stores having electric signs are also good prospects, and this business should be built up on a service basis entirely.

Just Jones Signs Up the Customer

My desire is to get my customers to sign up with me for lamp service for six months or a year at a time. During this period I shall make it a point to look at their electric signs at least two or three times a week and their lamp stock at least once a month.

I shall work out a minimum stock which each customer should keep on hand and as my man makes his monthly rounds let him make note of the requirements in order to fill up this stock to the required amount.

I find that this will build up business and will be giving my customers a service which they will certainly appreciate.

The selling of electric household appliances will need my most careful attention and study. I shall plan out a definite sales campaign, with a regard for local conditions and the needs of the community.

Always my purpose shall be to accomplish things in an original and effective manner—to gain and to hold the favorable attention of the buying public.

Developing New Business

BY W. S. BYRNE

(The increased cost of production consequent upon higher wages and higher price of materials has concentrated attention upon ways and means of meeting the situation. The negative method of directly reducing expenses as far as possible has many adherents, but the sales manager of the Nebraska Power Company, Omaha, favors concentration upon new business as more effective in the long run. This paper was presented at the recent N. E. L. A. Section Convention at Grand Island, Nebraska.—The Editor.)

We find ourselves confronted today by a problem which becomes increasingly difficult as time passes. Construction, reconstruction and development expenses mount apace while our economies in manufacture have apparently reached that point at which little improvement can be expected from the introduction of any new methods of manufacture or increased efficiency of apparatus. Our rates of return, too, in the vast majority of instances remain as in the pre-war period. But we must progress, and we have before us but one means of meeting the exigencies of the situation—new business.

Solving the Problem of Increased Cost of Production —

We must secure an increase of volume which will reduce in proportion the cost of production and operation. We must make two kilowatts grow where but one was before. New sources of outlet and income must be found, and when I say "new" I do not necessarily mean only new purchases, but increased use by existing customers as well. Probably in many instances, new products must be marketed or our

present commodities or service must be marketed in a new way.

It has been the experience of our company that the sale of merchandise can quickly be made, with a little intensive effort, 15% of the former income to the property. Putting this statement in a different way, it can be said that the merchandise business of a community of about 200,000 can very readily be made approximately \$1.50 per capita. In small communities, the income per capita should be correspondingly higher as a result of more direct contact with the purchasing public. This is not a matter of theory—it is exact fact brought out through analysis of our operation in small and large communities.

The public, however, can only be sold after your organization is sold. Acting on this principle, we were able in the month of March, this year, to show an increase of 72% over the preceding month, and a 12% increase in April over March.

Selling the Organization —

This condition is being maintained and is no sporadic peak. It is the healthy condition of our

business and market. These facts are proof of the truth of certain principles. First, irrespective of selling price and discount to the dealer, there must be selected types of appliances to be sold in which you have confidence and on which you are willing to stake the good name of your organization. Select that washing machine and vacuum cleaner which will unquestionably give service to the user and can be known in your community as the best device of its kind sold.

Second, secure from the manufacturer of these appliances the services of one of their factory experts who not only knows the quality and workmanship of the device in question, but who can bring the story home to your sales force, your repair force and in fact, your entire organization. Convince them that this is the appliance they should use in their own home and make it attractive for them to use it. Derogatory comment by a repair man can un-sell more appliances in one hour than your sales force can put out in a month.

Third, be prepared to give service on these appliances which is expert and rapid.

Fourth, demonstrate these appliances to the user until she or he is unquestionably versed in their proper use.

Fifth, bear in mind the fact that if you have not been merchandising in a broad way, it is necessary to overcome the fly-wheel effect of your organization against the progress of merchandising, and you must offer at least initially to the public, and to your organization, inducements which will convince them of the necessity of purchasing or selling these appliances.

Conducting a Campaign —

When I say, offer an inducement to the public, I do not have in mind promiscuous price-cutting. The successful and profitable policy is to sell at list prices, but since we are not essentially merchants, we can well afford to study the methods of the department store merchant in the same way in which you would expect him to study your methods in the manufacture of electrical energy.

In the opening campaign, you will find that it will probably be necessary to offer some nominal cut in price on some device or an improvement in payment terms, and some monetary inducement to your entire force to stimulate sales.

"Nothing succeeds like success." Carefully select the device for your first campaign. Plan the campaign, its advertising and the details of its conduct in such a way as to secure big results. This having been accomplished, the pioneering is over. Now keep eternally at campaigning.

Increasing Prices —

On one particular device, we found it necessary to increase our selling price as a result of the termination of a pre-war contract.

Before putting into effect this increase in price, we advertised and made it known through our organization, that due to this condition, it would be necessary for us to increase the price of this device on a certain date. As a result of this statement and our advertising, our sales in this particular line increased

about 25% over previous sales. Following the change in price, and for the purpose of instilling confidence in our organization as well as putting over the new price, we conducted a two weeks campaign at the increased price but made a reduction in the monthly payments when sold on the deferred payment plan. These new terms were advertised, the sales force went out with renewed vigor, and in spite of the increased price which was over 12%, we were able to increase our sales during the two weeks campaign to a point where they exceeded the sales of the former campaign by about 50%.

Deferred Payments —

Another fact which may be of interest and which our experience has brought out, is that the public generally is satisfied to pay an additional price or carrying charge for purchases on deferred payments. We are making a difference of from $7\frac{1}{2}\%$ to 12% in the selling price of our appliances sold on the time payment plan.

Persons who wish to purchase on this basis are reconciled to that fact. They generally realize that the protection is due you, and the unqualified statement may be made that the cost of carrying these accounts can be charged to the purchaser in this way and meet with his approval.

Limiting Home Demonstrations —

If you are selling a device which you know will give satisfaction and in which your sales organization has confidence, it is unnecessary at this stage of the public's familiarity with the appliance, to demonstrate it in the home before purchase.

During the months of March and April, we were able to save \$1,200 expense incident to the delivery and damage of washing machines and vacuum cleaners resulting from permitting them to be used in the home, by insisting that with our guarantee we knew that if the prospective customer was interested in the purchase of a given device, he could afford to make the initial payment or buy the machine outright before having it delivered to his home for use.

Explaining to the Customer —

Now as to the matter of new business resulting from the increase in the sale of our service. Many of the factors that caused us concern in our industry are pinching the toes of our prospective customer, and we may as a result secure audiences and consideration where the prospect has heretofore been adamant.

It is a generally accepted fact that even where increases in rates have been secured, the increase has not been in direct proportion to the increases in manufacturing expense. This fact, your local miller, elevator man or pumping station, may not realize. It is certainly most timely that new proposals and new estimates of the customer's present expense should be brought to his attention.

Growing Opportunities —

Business generally is in the most prosperous condition it has known for years. Men are more concerned in their operating conditions and are more cunning in their efforts to effect economies than ever before. In the vast majority of cases petty preju-

dices and former apparent high costs can be set aside through the active solicitation of power business, particularly. You are warranted in redoubling your efforts, and judging from the experience of numerous central stations, your success is practically assured.

Mercantile institutions are presenting their wares, and are operating their establishments in a way hitherto unthought of. Lighting is one of their best invitations to the customer to purchase. Let us cash in on this condition. We build not for today. The saturation point is a thing unheard of to the consumer. Let us, therefore, make known our wares, apply our fullest energies, and reap the harvest at hand.

Western Ideas

SERVICE ABSOLUTELY is a slogan adopted by a Salt Lake City electric supply company, and carried out even to the point of answering a complaint call before one connected with new business or a sale. But the reward is reaped in the absolute

DEALERS IN
SEWING MACHINES, WASHING MACHINES,
ELECTRIC VACUUM CLEANERS, MOTORS,
ELECTRIC IRONS, LAMPS AND REPAIRS

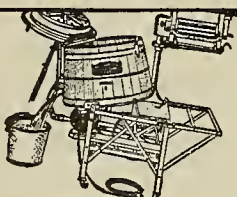
WALKER ELECTRIC SUPPLY COMPANY
WEST, RENT AND REPAIR SEWING MACHINES
BY THE WEEK OR MONTH

**WASATCH
1703**
AB-SO-LUTE-LY

159 SOUTH STATE STREET
SALT LAKE CITY, UTAH

PRESENTED BY
WM. J. KNOWLDEN

COMPANY
159 South State Street
PHONE WASATCH 4703
Representative Called Today



Cards used by the Walker Electric Supply Company of Salt Lake City, illustrating the principle of courtesy to customers in even the smallest matters.

confidence of customers and in the company's reputation of living up to its slogan, and the results are of distinct financial advantage, aside from their other aspects. The slogan covers everything that goes out of the store, even repair work on equipment not originally purchased there.

The same company makes use of a small calling card which is left in case a customer is not at home. This courtesy prevents misunderstandings, or a belief on the part of the customer that the company has neglected his call.

STUNT ADVERTISING is one of the most elastic and most effective of publicity methods for the retailer. We quote the following interesting and successful devices from "Western Advertising":

"A cigar dealer in Harrisburg arranged an exhaust from the motor of his delivery automobile so

that it reaches the tip of a huge cigar mounted on the roof. As the wagon goes about the city, the smoking cigar not only attracts attention, but indelibly impresses the name of the dealer upon all who see it.

An ice company solved the problem of proving the value of their ice by freezing a clock inside of a large cake of ice. This was then placed on the sidewalk with a sign reading: "See how long it takes our ice to melt."

A bank in the Middle West tried the experiment of placing a full-blooded cow on exhibition in the lobby, and 276 new accounts—the majority from farmers—were opened in a single day.

A clothing company in Indianapolis, Ind., secured fifty homing pigeons, attached to each one a tag entitling the finder to a suit of clothes, and then gave publicity to the project by widespread newspaper advertising. The result was an increase in sales which more than offset the cost of the pigeons and the suits which were given away.

Capitalizing the idea that crowds are always interested in action, the Moe Levy Company of New York makes it a point to change its window displays during the noon hour when the greatest number of people are on the streets. The window trimmer "carelessly" knocks over a figure and this in itself is sufficient to attract the crowd. After the display has been put in place, the manager comes outside, peers through the glass, and directs that certain changes be made. The crowd often takes such an interest in the proceedings that it will volunteer instructions as to the arrangements of the display."

TWENTY SERIOUS RETAIL LEAKS through which profits escape are listed by a retail specialist as follows:

Over-measurement of goods; reckless cutting of samples; nonavoidance of remnants; slothful care of stock; careless packing; improvident purchase and use of supplies; discarding empty cartons; shopworn goods through lack of suitable fixtures; poor arrangement of stores; extravagant illumination; pilfering of goods and money by employees; losses through incompetent window trimming; employing incompetent help; dissatisfied customers; carrying dead stock; poor buying; excessive alteration extras; poor advertising; poor bookkeeping, and passing discounts.

Probably no electrical retail business is suffering from all the twenty leaks, but most establishments can find two or three. Why not stop them up?

SENDING MAZDA LAMPS BY MAIL and adding the charge to the next bill for current is a convenience recently initiated by the Duquesne Light Company, Pittsburgh. The postal authorities will not insure the lamps, on the ground that they are too fragile, but the use of a special corrugated box package reduces breakage to a minimum, and the company undertakes to replace any lamps found defective if they are tested on receipt.

A telephone call or postal card to the electric shop of the company brings by return mail as many lamps as the customer may require.

MORE LAMPS ARE USED by people who have a case of spare lamps handy than by those who are accustomed to buy only two or three at a time. For this reason one electrical salesman has cultivated the habit of signing lamp contracts with small stores and factories for their yearly supply, instead of confining his attention solely to large lamp contracts.

A store which has an extra case of lamps on the premises will tend not to have empty sockets, whereas the custom of buying two or three lamps at a time induces postponement in the replacement of old or broken lamps.

The signing of lamp contracts with small stores brings in orders for cases of lamps and the owners of these do not make shift for an indefinite period with worn-out lamps and empty sockets. The result is an appreciable increase in lamp sales.

A CONVENTION IDEA which proved efficient and handy was the ticket book arranged by the American Society of Mechanical Engineers for its spring meeting. The book, which was about 4½ by 2½ inches, contained duplicate detachable tickets for every event of the convention. On the cover was an announcement to the effect that it was necessary for the visitor to have the book of tickets with him each day, and to register for each event at the time of receiving the book. In this way those in charge were able to keep track of the number to be expected at every event.

INCREASING THE SENSE OF RESPONSIBILITY of the individual citizen and making him understand that he, and not a vague impersonal municipal government, is called upon to maintain the standards of the city, is no simple task. The average man is all too prone to forget that he is a unit in a community, and a power for progress or stagnation. The following Code for Civic Betterment was issued through the Denver schools in order to bring the idea home in a direct, personal way to parents:

A Code for Civic Betterment

I volunteer to become a member of the Civic Betterment Movement, and will help to keep Denver a clean, beautiful and law-abiding city. I will assist in the following ways:

- 1 I will keep my premises clean and cooperate with my neighbors, in keeping the street directly in front and the alley in the rear, free from GLASS, paper, lawn-cuttings and litter.
- 2 I will endeavor to keep my premises free from DANDELIONS.
- 3 I will place a box or barrel for all tin cans and broken glass.
- 4 I will use a garbage can, with cover. I will keep garbage free from glass or anything that would be hurtful to hogs.
- 5 I will not use a vacant lot as a dumping ground.
- 6 I will not throw the rind or peel of oranges, bananas, apples, or other fruit on the sidewalk or in the street.
- 7 I will protect public property and encourage others to do the same. I will not waste the city water.
- 8 I will aid in preventing fires by keeping my attic, basement and yard free from rubbish, greasy rags, and waste paper; by being careful in the use of matches and explosives; by having chimneys and furnaces inspected and cleaned regularly; by keeping ash pit covered; by burning all waste paper in ash pit and never in furnaces, stoves or on vacant lots.
- 9 I will aid in any way I can to exterminate the house fly.
- 10 I regard it as a duty to plant a garden, if possible, and to encourage the garden work of our public schools and the cultivation of our city vacant lots.
- 11 I will observe our city ordinances relative to sanitation, fire prevention and care of public property, and help in securing other ordinances should the need arise.
- 12 It is my duty to have a reverence for the law, and show respect to our executives, city, state and nation.

Committee for Civic Betterment
Denver Civic and Commercial Association.

Affixed to the code is a detachable stub bearing the words, "I will gladly cooperate by carrying out to the best of my ability the Code for Civic Betterment," together with spaces for the signatures of parents and children, the address and the school district, with instructions to return the stub to the school.

MIRRORS IN YOUR SHOW WINDOW are a very effective device, but they should be placed with great care, or they will do more harm than good. The unprincipled public has an incurable tendency to use them for putting its hat straight, or seeing whether its shoes are run down at the heel. If you have mirrors in your window, arrange them so that they reflect your stock and not the street. It is all very well to be accommodating, but window displays have a purpose. Do not defeat the purpose by tempting the public to regard them merely as inconvenient obstructions to a handy mirror.



The Cleveland Trust Company has offered for the use of Cleveland firms the space adjoining its main building. The public has taken so keen an interest in these demonstrations that the spot has been named "Cleveland's Most Interesting Corner." This picture shows an exhibit by The Van Dorn Electric Tool Company of their portable electric drills.

The exhibit included a display of all the parts ready for assembly, each marked to indicate its particular function.

Two workmen were engaged to demonstrate, drilling large and small holes in plates of various thicknesses.

Effective House-Wiring Publicity

BY WILLIAM BLISS STODDARD

(Publicity is well termed "the light of directed attention." This article, by an electrical merchandising specialist, shows how to turn the light onto LIGHTING. The concrete examples here given, telling how leaders in this line have promoted popular interest in modern house wiring, will indicate methods by which other contractors and dealers can gain profit-paying publicity.—The Editor.)

Now that the days are getting shorter and more time must be spent under artificial light, it should be the aim of every householder to have the best light possible—and of course this is electricity. Accordingly, the electrical contractors and dealers should see to it that their "lines" are given the widest possible publicity ere winter sets in.

One of the most effective campaigns along this plan is being conducted by the Sterling Electric Com-



In the window of the Hatfield Electric Company, Indianapolis, Ind., was displayed an electric washing machine which had been run for a time "equaling more than 34 years of actual washing use." It proved a most forceful advertisement of the excellence and economy of this household utility.

pany, Minneapolis, Minnesota. They began by running a series of ads in the papers, one of which declared:

THE GREATEST SERVANT IN THE WORLD lurks in every electric light socket in your home. Why not let this ever-ready, tireless, electrical genius drive away drudgery from your home. Once your home is wired you have the benefit of the vacuum cleaner, washing machine, irons, hair curlers, hair dryers, percolators, toasters, chafing dishes, sewing machines—all run by electricity. And all of these conveniences may be secured on easy payments if desired—and you have their benefit while paying for them.

They followed this up with a series of cards in the street cars:

Wire us, and we will wire you. 'Phone Blank 3010.

Yes, we do electric wiring—and our prices are right.

Don't be like the Arkansas man who said, "On a rainy day you can't mend the roof, and on a fine day it doesn't leak."

Take time by the forelock, and let us wire your house before the rainy, disagreeable November weather sets in.

Perhaps their most effective agent, however, was their show window, which was hung with curtains of wine color. Against them stood the half-length figure of a man, with a card: "Electrify your Home NOW," and pointing to a large card on which was the picture of a suburban home, with little red ribbons running from each room to twelve white cards above and below, each of which described the equipment for that room, and the conveniences that could be placed therein. For example, on the card describing the Den was printed: "For Your Den, two wall or baseboard outlets for the use of reading lamp, bracket lamp, cigar lighter, chafing dish, fan, percolator, tea samovar, grill, toaster, vibrator, and radiator." In large red letters at the top of the card was printed: "Comfort Possibilities," and at the bottom, "Do It Electrically." The cardboard figure and the big sign were set on a base draped with green velvet, and against it leaned coils of wire, while on the floor were sockets, batteries, screws, casings, and other wiring supplies.

The office of the Pacific Gas & Electric Company, Redwood City, California, has been waging an electric wiring campaign, their advertisement being decidedly timely and practical:

BURGLARS WILL NOT VISIT HOMES WHERE ELECTRIC LIGHTS ARE BURNING

Recently the home of a prominent citizen of a near-by city was burglarized three times within a short space of time. The burglar was arrested, and the owner determined to learn, if possible, the cause of this unusual series of robberies.

"It was the only house on the street that was dark," said the burglar. "Take a tip from me. If you don't want burglars, keep some electric lights burning at night."

New wiring devices make it possible to flash on every light in your house and garage, from a switch beside your bed. What better burglar insurance and protection can you carry? When you go into your garage at night you can press a switch in your house and all the garage lights go on. When you return later with your car, press a switch in the garage and all the lights in the house flash on.

Ask your electrical contractor or dealer to show you how these wonderful new devices operate.

From the manufacturers they secured a quantity of cards quoting the price of mazda lamps of every size and for every purpose, and on the reverse side they printed:

FOR FIVE CENTS

THE PRICE OF A STREET CAR JOURNEY

YOU CAN light an average room with mazda lamps three hours a night for six nights.

Expert advice on residence, store and shop lighting will be cheerfully furnished by specialists on application to us.



This show window of the Sterling Electric Company, Minneapolis, Minn., makes an ingenious presentation of electric "Comfort Possibilities" in the home. Note the arrangement of the coils of wire.

From generalization to specialization was the step taken by the Hatfield Electric Company, Indianapolis, Indiana, who called attention to the convenience of the electric washing machine:

STOP! LOOK! AND LOOSEN!

An electric washer is not a useless extravagance—it is an investment that effects a very appreciable yearly saving.

Your clothes last from three to five times as long; your wash DAY is turned into wash HOUR; and best of all, the little old machine runs right along year after year—it is built to last a lifetime.

As in the case of a number of other electrical concerns, they offered to give a free demonstration of the machine at the home of the prospective purchaser. The window that they used to supplement their newspaper advertising was one of the most practical demonstrations of the usefulness and long service of the washing machine that could be imagined. In the center foreground was shown an electric washing machine, busily churning the suds, and a large card beside it called attention to the fact that:

THIS ELECTRIC WASHING MACHINE

has run at least six hours per day for the past three years. This equals more than 34 years of actual washing use, at a cost of less than five cents an hour. It is operated by a worm gear, which is one reason why the machine does not wear out.

The machine was seen to be in excellent condition, and since seeing is believing, the durability of the machine was at once impressed upon the mind of all beholders. At the extreme end of the window was a life-size cut-out of a woman using an actual electric iron.

PENSIONING EMPLOYEES

(Among outstanding examples of the growing co-operation between employers and employed is the large-scale plan of pensions and disability benefits newly instituted by the Southern California Edison Company and briefly outlined here.—The Editor.)

To every employe of the Edison System, who by long and faithful service becomes entitled to receive it, a generous retiring pension has been provided. To employes who have qualified by service, a disability benefit may be granted, should physical misfortune befall, in later life, before the retiring age and period of service has been attained.

In the plan for pensioning retired employes, and providing for those disabled, the management of the company has devised one of the broadest and most comprehensive systems of equitable provision for age that has thus far been achieved. It has no taint of charity; nothing to compromise self respect or independence, but is made a right of contract; a part of the employe's expectancy for the period of life when to most persons the necessity of an income is the greatest.

Pensions and disability annuity added to other things make the service attractive, and assure to those entering it the opportunity to develop individuality and initiative, to accumulate property, and to work to the best of their ability in one of the newest and greatest industries of the age. There is opportunity to purchase stock in the company; medical and hospital care in case of illness; business and technical educational opportunities provided to qualify them for advancement; and the desire on the part of those in authority that every individual in the organization shall measure up to full capacity. And now comes the assurance of provision in case of disability and a competency in age.

The contract conceived by President W. A. Brackenridge, and approved by the board of directors and ratified by the Railroad Commission of the state, establishes the principle of pension compensation as a matter of contract and assures the employe who fulfills the reasonable obligations of the service that it will be paid when the time of retirement arrives as a matter of right and is collectible by law. A contract will be duly executed and delivered to each permanent employe of the company.

The chief features of the contract, with an interpretation of the reasons for their adoption, are in substance as follows: Not only the employes of the Southern California Edison Company, but those of all of the subsidiary companies, are included in the plan, thus there is no discrimination against any of the men or women who have come into the Edison family. The other corporations, each of which pay to the pension the pro-rata of the time employes have been in their service, are the Mt. Whitney Power and Electric Company, the Santa Barbara Gas and Electric Company, the Santa Barbara and Suburban Railway Company, the San Joaquin and Eastern Railroad Company, and the Huntington Lake Hotel Company.

Male employes reach the age of retirement at sixty years, female at fifty-five, when they have been in the continuous service of the Edison Company or

any of its subsidiary companies for twenty years immediately preceding retirement.

The following scale applies to those who can be retired before serving twenty years: men sixty-one, women fifty-six, who have served continuously nineteen years; men sixty-two, women fifty-seven in service eighteen years; men sixty-three, women fifty-eight, service seventeen years; men sixty-four, women fifty-nine, service sixteen years; men sixty-five, women sixty, service fifteen years.

The monthly pension allowance is based upon the average monthly compensation the employe received during the five years period of employment when the compensation was the greatest, computed in this manner:

Two per cent of the first \$200 monthly compensation, one and one-half per cent of the next \$300, one per cent of the next \$500, three-fourths per cent of the next \$1000, and one-half per cent of all such average monthly salary above \$2,000. The figure or sum thus determined is multiplied by the number of years of service immediately preceding retirement, and the sum thus determined shall be paid the retired employe until death. No payment, however, shall be less than \$25.00 per month.

A disability benefit is provided for employes who have been in the service twenty years, and who become disabled in any manner, upon the recommen-

dation of the Pension Committee, approved by the President and the Board of Directors, or the Finance Committee. There is also a clause giving the management some latitude to grant disability benefits to those disabled who have not served the full twenty years.

The period over which the disability benefit shall extend is to be determined and fixed by the Pension Committee and all of the terms and conditions of the disability benefit may be changed from time to time in the discretion of the committee, with the approval of the President and the Board of Directors or the Finance Committee, but in no case shall the disability benefit exceed fifty per cent of the salary, at the time the benefit is granted. The disability benefit, however, is not like the pension, and does not become a liability of the company.

To ascertain the amount of the pension to which an employe would be entitled at the end of twenty years, or from fifteen to nineteen years, if he is in the older class, the following example shows the methods of computation:

John Smith, an employe, reaches the age of sixty years after twenty-three years of service and is retired on pension. His average pay for the highest five years of service was \$180.00 per month. Two per cent of \$180.00 is \$3.60, which multiplied by the twenty-three years of service gives him a retiring pension of \$82.80 per month.

The Salesmen's Auxiliary

BY HOWARD ANGUS

(The work of the California Electrical Cooperative Campaign no longer needs any introduction. The newest scheme of this enterprising organization and the practical working out of the plan are here described in full by the Secretary of the Cooperative Campaign.—The Editor.)

The Salesmen's Auxiliary is now organized and at work under the supervision of the Advisory Committee of the California Electrical Cooperative Campaign and is actually showing the electrical dealers how to improve their businesses and better serve the public in conjunction with the Campaign's Field Representatives.

The question—What is the Salesmen's Auxiliary?—can be best answered by answering three other questions.

1. Why is the Salesmen's Auxiliary?
2. What is its work?
3. Who make up the Salesmen's Auxiliary?

A Definite Need —

Before any organization is attempted, there must be a definite need for it. The Advisory Committee in carrying its educational campaign to the electrical industry found that California was too large a territory and the electrical dealers too numerous for the work to be carried on intensively and with the maximum results by three men—its Field Representatives. These three men by hard, conscientious effort, have accomplished excellent results in a year and a half, but they presented this difficulty to the Advisory Committee. They said, in substance:

"Our territory is so large that at best we can only cover it four times a year. We are able to show

substantial improvements in some instances but not in others. Some men are quick to see an idea and quicker to put a paying plan into operation. Those men we are helping greatly and their businesses are growing by leaps and bounds. There are other men, however, who respond more slowly. We lay out a plan for them. They accept it as good and promise to put it into operation. But on our next trip we find they have failed to act. Instead of being able to give them something new, we have to go over the same ground and plant the same idea again. If our territories were smaller, we could get faster results out of the slow ones. If there was somebody to drop in on the electrical dealers in the interim between our trips and pour a little water on our ideas that they might sprout and grow, the slow ones would improve faster."

Enlisting the Salesmen —

The Advisory Committee knew of no way to shrink the state of California and began looking around for the men who were best able to supplement the Field Representatives' work. Somebody asked, "Why couldn't the salesmen of the manufacturers and jobbers help out?" Somebody suggested, "They are continually visiting the electrical dealers." Another said, "They could help." R. M. Alvord of the Advisory Committee began working on a plan.

The Salesmen's Auxiliary is the result of his thought. This brings us to the question, What is the work of the Salesmen's Auxiliary?

The most important work of the Salesmen's Auxiliary finds expression in actually putting into execution certain ideas which the electrical jobbers of San Francisco and Los Angeles have been expressing in public speeches and private conversations. To sum up these ideas in a sentence: Salesmanship consists in showing the retailer how to sell his merchandise rather than in obtaining more orders from him, because orders will naturally follow if the merchant is able to sell satisfactorily.

Cooperation Pays —

The California Electrical Cooperative Campaign is the organization that has most often voiced these thoughts, and has devised the ways and means of putting them into actual practice. The members of the Salesmen's Auxiliary are, therefore, first of all boosters for that organization, and point out to the merchant why he should put into practice the paying ideas the Campaign's Field Representatives have for his use. When a member of the Salesmen's Auxiliary calls on a dealer he talks to him something like this:

"I saw Jones the other day and he is using the new accounting system that the California Electrical Cooperative Campaign is introducing to the electrical dealers. He is enthusiastic, says that for the first time he really knows his business, knows where the leaks are and how to stop them.

"Smith has remodeled the inside of his store and told me that a field representative gave him the idea. It is resulting in more sales for him.

"Brown has moved into a new location found for him by a field representative and says his business has doubled."

By such talks as this the salesmen call forcibly to the dealer's attention just why it will pay him to adopt the various plans of the California Electrical Cooperative Campaign for improving his business. It is hoped that the Field Representatives will find as a result every dealer anxious for suggestions and ready to put them into operation.

Exchanging Ideas —

The work of the Salesmen's Auxiliary goes farther than that. As its members circulate through the state of California they gather helpful plans and naturally carry them from dealer to dealer as they go. From now on they will be continually improving the business methods of the contractor and dealer.

Each salesman is interested in seeing that his own merchandise, at least, is rightly presented to the public and sold. The Advisory Committee, realizing this natural tendency, have wisely selected for each territory salesmen handling several representative lines of electrical heating appliances and labor-saving and convenience devices. This brings up the question, Who are the members of the Salesmen's Auxiliary?

Personnel of the Organization —

The Salesmen's Auxiliary consists of selected executives and salesmen of the manufacturers and

jobbers. At first the thought was to organize all salesmen into helpers, and the Advisory Committee still appeals to all for aid—to those not in the organization as well as to those who are. But further thought convinced the Advisory Committee that the organization would be too unwieldy if it included all; that it would be much better to give responsibility definitely to certain designated men—these men to be responsible for actually carrying to their own organizations the educational ideas of the Campaign and assisting the Field Representatives in their work. Thus the Salesmen's Auxiliary was formed.

Salesmen's Auxiliary Organization

Chairman: M. J. Verdery, Edison Electric Appliance Company, San Francisco.

Secretary: L. J. Brown, Western Electric Company, San Francisco.

Members at Large:

F. J. Airey, Pacific States Electric Co., Los Angeles.
H. W. Allen, Graham-Reynolds Company, Los Angeles.
Clark Baker, National Lamp Works, Oakland.
F. E. Boyd, General Electric Company, San Francisco.
J. O. Case, General Electric Company, Los Angeles.
F. J. Cram, Electric Appliance Company, San Francisco.
J. E. Crilly, National Conduit & Cable Co., San Francisco.
Geo. Curtiss, Electric Ry. & Mfrs. Supply Co., San Francisco.
P. G. Gough, Listenwaller and Gough, Los Angeles.
Ross Hartley, Electric Corporation, Los Angeles.
H. G. Holabird, Holabird Electric Co., San Francisco.
R. A. Holterman, Holabird Electric Co., San Francisco.
H. C. Hopkins, Westinghouse Electric & Manufacturing Company, San Francisco.
J. L. Kline, Western Light & Fixture Co., Los Angeles.
C. D. Lamoree, Westinghouse Electric & Manufacturing Company, Los Angeles.
L. Van Atta, Pacific States Electric Co., San Francisco.
A. B. Vandercok, Western Electric Co., Los Angeles.

SAN FRANCISCO BAY DISTRICT

Territory of Field Representative Curt C. Davis.

Vice-Chairman: H. H. Hoxie, Holabird Electric Company, San Francisco.

District Members:

R. E. Kenyon, General Electric Co., San Francisco.
Oroville Johnson, Western Electric Co., San Francisco.
R. S. Prussia, Westinghouse Lamp Co., San Francisco.
Herbert Rea, Pacific States Electric Co., San Francisco.
H. F. Schultz, Electric Appliance Co., San Francisco.
H. E. Shields, Electric Appliance Co., San Francisco.

CENTRAL DISTRICT

Territory of Field Representative W. F. Brainerd.

Vice-Chairman: C. D. Herbet, Westinghouse Electric & Manufacturing Company, San Francisco.

District Members:

M. S. Barnes, General Electric Company, San Francisco.
W. E. Camp, General Electric Company, San Francisco.
H. D. Harvey, Electric Appliance Co., San Francisco.
B. W. MacKie, Western Electric Co., San Francisco.
A. H. Noyes, Electric Appliance Co., San Francisco.
H. A. Sales, Holabird Electric Co., San Francisco.
A. E. Skillicorn, Pacific States Electric Co., San Francisco.

SOUTHERN DISTRICT

Territory of Field Representative A. L. Spring.

Vice-Chairman: D. C. Pence, Illinois Electric Co., Los Angeles.

District Members:

C. T. Carr, Pacific States Electric Co., Los Angeles.
L. E. Darrow, Western Electric Co., Los Angeles.
G. H. P. Dillman, General Electric Co., Los Angeles.
W. R. Edwards, Pacific States Electric Co., Los Angeles.
P. C. Ensley, Graham-Reynolds Electric Co., Los Angeles.
J. H. Jamison, Westinghouse Electric & Manufacturing Company, Los Angeles.
E. L. Nightengale, General Electric Co., Los Angeles.
J. A. Sines, Illinois Electric Co., Los Angeles.
A. A. Smith, Graham-Reynolds Electric Co., Los Angeles.
Harry Summers, Westinghouse Electric & Manufacturing Company, Los Angeles.
C. A. Sunderlin, Western Electric Co., Los Angeles.
Geo. Vedder, Illinois Electric Co., Los Angeles.

The officers and the members at large are executives in manufacturing and jobbing companies. The district members are the salesmen who actually come into direct contact with the contractors and dealers. The duty of the officers is to direct the work of the Campaign. The members at large are to enthuse their organizations with the educational ideas of the California Electrical Cooperative Campaign and make suggestions and criticisms to the Advisory Committee, that the latter's work may be more effective. The

state has been divided into three territories corresponding to the three territories of the Campaign's Field Representatives. To each of these territories a vice-chairman and a group of district members have been assigned to supplement the work of the Field Representatives. These district members are actually carrying to the electrical contractor and dealer the ideas of the California Electrical Cooperative Campaign and supplementing the work of the Field Representatives.

Cooperation as a Bankable Asset

BY C. W. BANTA

(The relationship between sales management and finance is a factor to which every business should give special attention, and in which the cooperation of the bank is invaluable. That the bank can and does devote itself to the best interests of its customers, thereby exemplifying the new spirit which is permeating the business world, is shown in this third article on cooperation by the Assistant Cashier of the Wells Fargo Nevada National Bank.—The Editor.)

The treasurer of a certain corporation came to my desk and applied for a loan of some thousands of dollars. I knew the firm, and that they would be good for twice the amount, so I replied that the fund would be forthcoming as required, at the usual rate of interest, for the usual period of time.

He thanked me, and informed me that the sales department had developed a program that would double their business during the coming year.

I asked, "How?"

He replied: "There will be no trouble to sell the goods, we have captured the market. The question is, can we produce sufficient to meet the demand?"

I asked, "What are you going to do with the money you just borrowed?"

"What's the matter, are we not good for it?" he replied.

"Certainly," I said. "You are good for twice the amount, even if you should have a disastrous year and lose all you borrowed. I could, ultimately, make you pay."

"We are going to expand our factory," he said; "the money I borrowed is to go into new machinery. We already have the bids."

"Tell me," said I, "do you really intend to pay back that advance when due?"

"Sure. Are we not good for it?"

"Yes, but that isn't the question. How can you pay it back?"

"Out of the increased income and profits."

"Yes," I said, "that looks easy, but you haven't cash enough to buy that machinery and, if you double your sales, you will have to carry twice your present accounts receivable. Where is the amount coming from? Besides, if you double your business next year, you might have to give a little longer terms or lower your credit department standard."

"You might as well lay out the whole year's program in finance as well as sales," he said.

"Where are you going to get that money to finance these sales?" I asked. "If you want it from the bank you had better negotiate for it now, to be taken and used as you need it."

"I don't think that arrangement is necessary. We know we can get by somehow if we have that

machinery. Besides, if you won't give us what we want, another bank has recently offered us three times what we've asked of you."

"Your sales and production program looks all right, but your financial program is not even half baked. Think it over."

I told him several stories to illustrate the point that a bank should not knowingly assist in, or allow a blunder to become an economic loss.

Gold in Its Right Place —

If a young man should come to me to borrow against the collateral of his estate, to squander the money, I should forego the business.

Doctors prescribe that radium in a tube be placed in the patient's throat to assist in the correction of certain dangerous tendencies—but for the patient to deliberately or carelessly swallow the radium would result in an unnecessary loss and would even injure the patient.

Radium is so valuable that even the doctors cannot afford to own it. They rent it by the day.

So it is with the bank. Gold is a drug; when placed in a business where it is both necessary and useful, it has a stimulating effect. But the gold, like the radium, is very valuable. It belongs not to the bank, but to the industrious and thrifty—to the laborers—both kinds,—to those who work with their muscle and to those who use their minds and inspiration to produce new things for the comfort and enjoyment of mankind.

One-Sided Estimates —

Later, the president of the company came in for a talk. I told him that to succeed in his plans, as outlined, would make his company's figures larger, but would reduce its standing from first to second grade. He would not be able to discount his bills and would be up to his chin in debt. We made up an imaginary financial statement to prove it.

The manufacturer went home, called a directors' meeting, and pointed out the flaw in the company's policy. The treasurer stated, at that meeting, that he knew it could be done but that he did not just see how. The heads of all the departments were called into the conference. A survey of the business, as it

stood, as it should be, and as it could be with the new program in force, was immediately taken.

Overhauling a Business —

The purchasing agent was told to inquire and advise the minimum amount that it would take to purchase the machinery—some second-hand—in job lots—or wherever a bargain could be obtained. The stock clerk was to furnish an estimate of the minimum amount of raw material that it would be necessary to keep on hand to supply the new factory's turnover. The collection department was asked for a report of the average number of days that it took the customers who were not discounters to pay. In fact, every department of the business was ransacked for facts. For the first time in years, every executive and department manager jumped to his toes to think—examine—plan—cooperate.

The Results of Investigation —

At a meeting a week later, the results of the thought and discovery were laid on the table.

The purchasing agent had discovered where he could buy the machinery of another concern located at some distance, that had failed, at somewhat less than half of the estimated cost, and at less than half of the amount that they had expected to borrow of the bank. The factory manager found that if necessary he could use one floor less than he had originally intended.

The collection department found that many of their oldest and best customers had fallen into careless methods in settling their bills; in fact, that a number of accounts that should have been closed monthly, had not been balanced for several years. The credit department found that in some cases, old concerns with whom they had done business had gone to seed. The treasurer remarked that the company had become a bank in financing some of the decrepits.

The collection department stated that if the firm would adopt the policy that some of their competitors already had, of requiring that bills be discounted upon the 10th of the month following sales at 2% discount, or that customers wishing longer periods be asked for trade acceptances, 30 days net, the old accounts could be automatically cleaned up and possibly some tens of thousands of dollars be placed at the disposal of the business, rather than idling with these delinquent customers.

The stock clerk's report was the most surprising of all. He found that the company had actually an immense amount of raw materials on hand, in fact, about five months' requirements. They had purchased job lots at close prices wherever offered; the profit that they could take on this merchandise was considerable, because it could be sold at market prices. After a conference, in which market conditions were discussed, they decided to sell, and take their profits on the excess of sixty days requirements.

For once, they beat their competitors to it. Within a month all of the manufacturers in that line of business commenced to feel that the market had

reached the high point and that it would be best to limit their supply of raw materials to a few weeks requirements—consequently, the market went down.

Revision of Plans —

The president and the treasurer and the sales manager came to the bank, laid out their revised plans before the officials and were told that the bank would advance them dollar for dollar for the trade acceptances that they might discount, at a lower rate than the current rate of interest, and that the bank would advance them sufficient to discount all their bills, including those incurred in the purchase of the new machinery.

The company had arrived at a well-balanced and well-defined policy. Production balanced sales and finance met both in cooperation.

Efficiency, which is nothing more than common sense, commenced to scare out inertia and half-baked ideas.

An Unbalanced Policy —

I remember a case of a great eastern manufacturing house that engaged the services of one of the highest paid sales executives in this country—in the world, for that matter. The board of directors asked him to present a policy, and he soon presented a program to dominate the field in that particular line. The whole organization became enthusiastic in the anticipation of a great success.

The company had long held an enviable reputation in the trade, and its bankers stated that they would be willing to discount any paper that the company should present.

The credit department of the company adopted a policy, liberal enough to attract the business that might, on an even break, stay with their competitors; terms were stretched to 16 or 18 months; installment contracts appeared.

The obligations of farmers and merchants throughout the country came pouring in and were discounted, and when the banks in that city had enough, the paper was re-discounted in the great money centers. The company doubled the size of its plant and then tripled it.

Then, one day, the load that the financial institutions were carrying on behalf of this concern began to receive attention. The money market tightened. The advances were found to be out of all proportion. The financial situation all over the country became more acute. The farmers paid their more immediate bills and let these long time obligations slip over until the next year. The banks became uneasy as to the value of the securities that they held.

In fact, about a year after the disaster, I sat in the office of the man who had once been the treasurer of that company and who was responsible for its financial policy. He said:

"The most wonderful business opportunity that I have ever seen went wrong because the sales policy of the organization was too heavy for its financial shoulders and because the foundation of the financial policy was not built strong enough to uphold the structure that the sales organization had built."



View from the smoke stack of the Lacombe plant—looking west over the outskirts of Denver to the Rocky Mountains

New Electric Generating Station at Denver

BY H. H. KERR AND T. O. KENNEDY

(A complete description of the equipment and operation of an up-to-date generating station is given in this account of the new Denver plant—one of the most important and interesting of recent electrical developments in the Inter-Mountain region. The authors are construction engineer and general superintendent, respectively, of the Denver Gas & Electric Company.—The Editor.)

The new Lacombe plant of the Denver Gas & Electric Light Company embodies so many new features that a brief description will, perhaps, be of interest.

The rapid growth of the company's business, together with the increased efficiency that could be obtained by concentrating the steam generating capacity in large units in one centrally located plant, led to the decision to build the new station that has recently been completed.

A Desirable Location

The site chosen adjoins the old Lacombe station on the South Platte river and is an ideal location, being practically in the center of load distribution. The only new buildings necessary were a boiler room and a transformer house, since there was ample space available in the existing engine room for the turbine and condenser equipment. Railroad facilities connecting the new plant to the Denver and Inter-Mountain and the Colorado and Southern Railroads were easily obtained and insure adequate service for coal supply and ash removal.

Stream flow records on the river cover a period of five years and indicate sufficient condensing water for 30,000 kw. plant capacity. The river water is not suitable for boiler feed purposes without treatment, and two artesian wells were put down to provide boiler water. One of these wells is pumped by an air lift, the other by means of a motor-driven deep well pump. Both wells discharge into an overhead storage tank 20 feet in diameter and 10 feet high.

Boiler Room Equipment

The boiler room is a concrete, steel and brick building 58 feet by 158 feet, having a 13-ft. basement and 45-ft. headroom above the firing floor. The building is roofed with large gypsum slabs covered with tar paper and gravel. The north and east walls were made permanent of brick and the south and west walls are of temporary construction, being hi-rib steel plastered with a cement gun. This will facilitate future extension to accommodate additional boilers up to a total of eighteen 750-hp. units set singly.

Four 750-hp. Connelly four drum water tube boilers were installed. Each boiler is set singly and covers a floor space of 20 feet by 20 feet. A 15-foot aisle is allowed between adjacent boilers. Working steam pressure is 275 pounds, and it is expected the boilers will operate normally at 200% of rating, being crowded up to 300% on peak loads. The boilers have been set very high and the furnaces are lined with carborundum brick in order to increase the life of the settings and to eliminate clinker trouble. The settings are made air tight by a coating of Crown Plastic Boiler Cement, which is manufactured at the Tar Works of the Denver company. A four-inch thickness of insulating brick in the boiler walls practically eliminates radiation losses. Recording thermometers, draft gauges, steam flow meters and Bailey boiler meters are provided to enable the operators to obtain the most efficient results.

The boilers are fired by Westinghouse underfeed stokers, nine retorts per boiler. Foster superheaters provide 200° F. superheat, which brings the total temperature of the steam up to about 650° F.

Vulcan soot cleaners for operation with superheated steam were installed for keeping the heating surfaces of the boilers free from soot and dust accumulations.

The four stokers are chain driven from a shaft hung on the basement ceiling; the shaft, in turn, is driven by either of two Westinghouse trunk piston engines. Forced draft is provided by two Buffalo blowers, each driven, through gearing, by a Westinghouse turbine.

Two Green economizers were installed, each one taking the heat from the flue gases of two boilers and transferring it to the boiler feed water. These economizers are located on a balcony back of the boilers.

Ventilation Arrangements

Fifteen feet headroom is allowed above the boilers and economizers, and this, combined with the fact that a large overhead monitor and sash and large windows were provided, insures plenty of light and ventilation. The space under the economizer

balcony is utilized for flue passages with the exception of one section which is fitted up as a locker room where shower baths, steel lockers and other facilities are provided for the station operators.

A 300-ft. by 12-ft. reinforced concrete stack was erected which will provide sufficient draft to carry



The old station is shown at the left of the smoke stack; the new boiler room on the right. In the foreground is the South Platte river.

normal load through the economizers. This stack, with its six-foot "Doherty Emblems" at the top, has already become one of the well known landmarks of Denver's sky line. The base of the stack, for a height of ten feet, is used for the storage of hot water for boiler feed.

Pumping Units

The boiler feed water is handled by three units each consisting of two Manistee, four stage centrifugal pumps directly connected to a 95-hp. steam turbine. Each unit has a capacity of 300 gallons per minute and is so arranged that the first pump forces the water through the economizers and the second pumps from economizer to boilers. The total head pumped against is 410 feet.

A discarded surface condenser is utilized as a feed water heater, the hot water then passing into the base of the concrete stack from which the pump suction is supplied. The water is metered by a Bailey fluid meter.

Unloading and Storing

For unloading and storing coal a stiff-leg jib crane was installed. The boom swings over a 160-ft. diameter circle and a traveling grab bucket allows coal to be piled 20 feet deep over the entire area. The crane is operated by a motor driven hoist, and is so set that an underwater storage pit can be excavated at any future time without interfering with the crane foundations.

A track hopper has been provided for dumping hopper bottom cars. This hopper can also be served by the crane. A Jeffery single roll coal crusher is installed under the track hopper and feeds an inclined belt conveyor which delivers the crushed coal through a tunnel to the basement of the boiler room where a bucket elevator raises it to a scraper con-

veyor near the roof. This scraper conveyor delivers the coal to any one of four bunkers above the firing aisle.

Each of the four overhead bunkers has a capacity of 70 tons and will ultimately supply two boilers, one on either side of the firing aisle. Coal to each boiler is measured through a volumetric meter installed in the down spout. The construction of these bunkers is unique, consisting of steel reinforcing bars and expanded metal supported from the building columns and concreted with a cement gun.

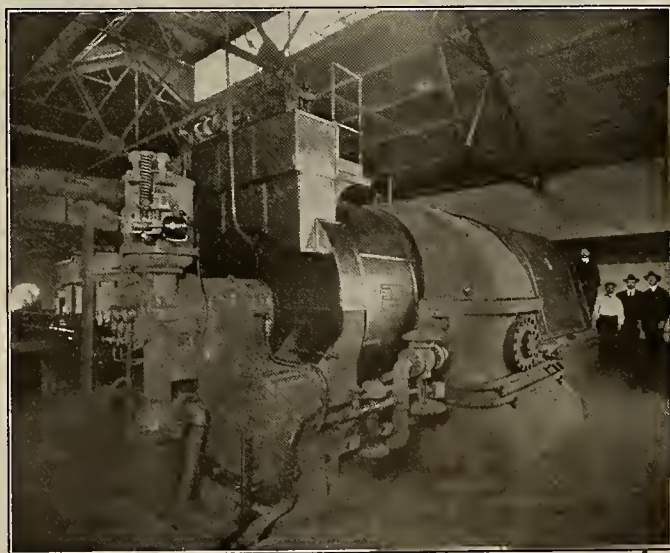
A concrete ash pit is provided under each boiler with arrangement for quenching. Each of these pits discharges through three dumping gates into a sluice directly under the pits. Large clinker is broken over a grizzly and all refuse is sluiced into an outside pit within reach of the crane, by means of which it is loaded on railroad cars for disposal. River water for the sluice is provided by a motor driven centrifugal pump.

Generators and Condensers

A 12,500-kw., 4000-volt General Electric turbo-generator was installed and under the excellent operating conditions as regards steam pressure, superheat and vacuum it will carry 15,000 kw. at a very low steam rate. A 100 kw. General Electric turbine-driven exciter provides excitation for the new unit.

The condensing equipment consists of a twin No. 19 Westinghouse Le Blanc jet condenser installed immediately underneath the turbine, which is supported on a reinforced concrete foundation. The auxiliaries of each condenser are driven by geared turbines and in addition one condenser has its auxiliaries directly connected to an induction motor.

An intake and screen house was built on the river bank in which are installed two stationary and



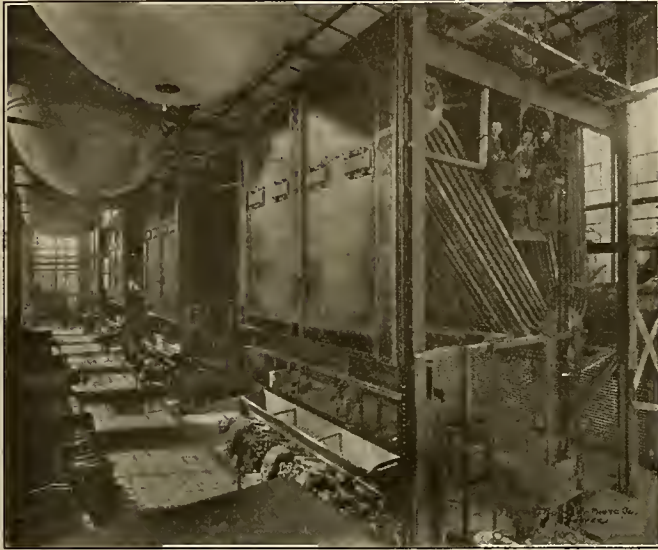
A 12,500-kw. turbine at the Lacombe Generating Station

one revolving, self-cleaning screen. From this screen house the condensing water flows through a concrete tunnel into an open settling basin in the basement of the boiler house. This settling basin is 18 feet wide and extends the full length of the boiler room; the side walls are brought up sufficiently high to prevent overflowing during floods in the river.

The various condensers in the engine room take water from this settling basin through cast iron pipes and all discharge into a common wood stave pipe, which enters the river about 100 feet below the intake. By means of a tile line connecting with this wood stave pipe a small amount of hot water may be discharged above the intake in the winter time to prevent the clogging of the screens by ice.

Switching and Transforming House

Since the main distributing switchboard is at the West Station, it was necessary to provide a



The boiler room under construction. The automatic stokers are fed from overhead storage drums.

heavy tie line between the two stations, which are about one-half mile apart. A 4000-volt, 8000-kw. line was already up and arrangements were made for a 13,200-volt, 8000-kw. line to handle the additional load. This necessitated the construction of a high tension switching and transformer house. This house is of brick 42 feet by 54 feet and two stories in height. Four banks of transformers can be located on the first floor, and all circuit breakers, lightning arresters and switches are on the second floor. Several high tension suburban feeders and the connections to the hydro-electric transmission lines are taken care of in this switch house in addition to the West Station tie line.

Increased Demand for Power

The need for the additional capacity provided by this new plant has been demonstrated by the fact that the electric output of the company for the first three months of 1919 exceeded the output for the same period last year by over thirty per cent.

The cessation of hostilities in Europe immediately produced increased activities in Denver instead of a slump in business, as was experienced in some of the Eastern cities. All indications point to a very great increase in the power requirements.

The design and construction of the plant was under the general supervision of W. J. Barker, vice-president of the Denver Company, and M. R. Bump and R. G. Griswold, of the New York office of Henry L. Doherty and Company. H. H. Kerr was in charge of construction.

RECONSTRUCTING HYDRAULIC UNITS

BY CHAS. H. TALLANT

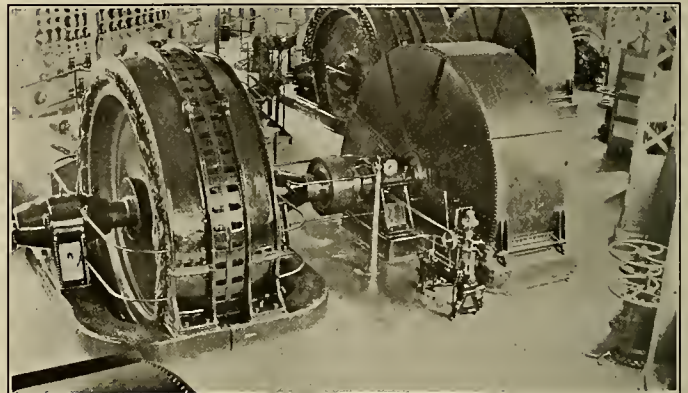
(The increasing of plant equipment and its bearing upon increased output makes continual revision and renewal necessary. How out-of-date hydraulic units, rebuilt to the newest design, are increasing plant capacity to a remarkable extent is described here.—The Editor.)

The rapid advance in improvement in hydraulic impulse turbine design in the past few years has made extensive capacity increases possible in central stations operating old hydroelectric equipment, through reconstruction of the hydraulic units. Impulse turbine units of early design which are still in good operating condition are being rebuilt to deliver an increase in power output as high as 20 per cent in some cases.

The extent and nature of the alterations to the hydraulic units depends on their original design and on the relative conditions under which the units have been and are to be operated. Some units have shown very satisfactory increases simply through the substitution of new buckets, while in other cases complete new runners and nozzle mechanisms have been installed, to effect the desired improvement in efficiency and output.

Obsolete Waterwheels Renewed —

Alive to the possibilities of such reconstruction,



Equipping an old turbine with new buckets and nozzle, and readjusting the runners, has resulted in a highly satisfactory increase in efficiency.

the Pacific Gas & Electric Company of San Francisco has reconstructed several obsolete waterwheels. One of these just completely put back into service is at the plant at Electra, the hydraulic units of which have been rebuilt by the Pelton Water Wheel Company.

The original plant at Electra was erected in 1902 for the old Standard Electric Company, the units having been built at the Union Iron Works, in accordance with the best practice prevailing at that time. The wheels were equipped with twin runners on the same shaft inside a single housing, and each runner was supplied with water separately through individual gate valves and nozzles. The nozzles were of the old deflecting type, without needles. Regulation was accomplished by deflecting the nozzle for variations above half load and by closing one gate valve on the duplicate pair in each unit for variation below half load.

Increased Efficiency —

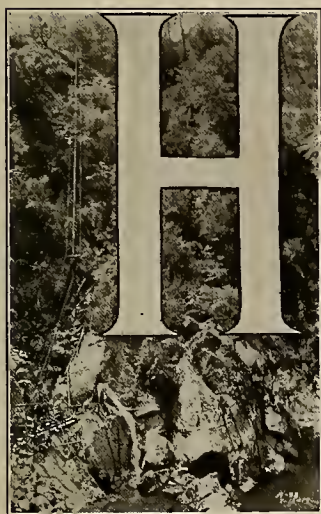
Reconstruction of the Electra plant was undertaken to provide increased power output with the same water consumption. One complete runner in the unit was discarded and the other, equipped with new high efficiency buckets, was moved along the shaft to mid-position. A Y-nozzle, with needle and sleeve type jet deflector, was connected to the mul-

tiple penstocks, replacing the two open type nozzles. Normal regulation is now obtained by manipulation of the needle, with the deflector for use in emergency control.

Operating tests run on the rebuilt units showed extreme smoothness of operation under all loads, and an efficiency increase of 10 per cent, the water consumption being less than before the rebuilding.

A Record in Quick Construction

(The reputation of the West for large hydroelectric developments and quick construction is well maintained by the phenomenal progress of the San Joaquin Light and Power Corporation's Kerckhoff project, some of the main features of which are described below. The rapid development of this plant is being followed with the greatest interest.—The Editor.)



View showing location of pump and pipe line for water supply for camp No. 4.

HYDROELECTRIC power development will have a record-breaking example of quick construction in the Kerckhoff project of the San Joaquin Light & Power Corporation. The plant, which is on the San Joaquin river a few miles below the Company's No. 1 power house, is to be completed by the early spring of 1920, and some 2,000 men will be employed to accomplish this. The water for the new power house will be taken from the main

San Joaquin river, by means of a large concrete diversion dam and a system of tunnel and conduit over five miles in length. The dam is to be of the single arch masonry type, 100 feet high, 400 feet across the top and 50 feet at the base. Its construction is requiring some very interesting feats of engineering. As it is impossible to divert the flow of the river during the construction period, one half will be built with a temporary opening in the lower part through which the river will flow while the other half is being constructed. About 30,000 cubic yards of concrete will be used.

The dam will create an artificial lake two miles in length, to be known as Kerckhoff Lake. This will be 100 feet deep at its deepest point.

Tunnel and Conduit System —

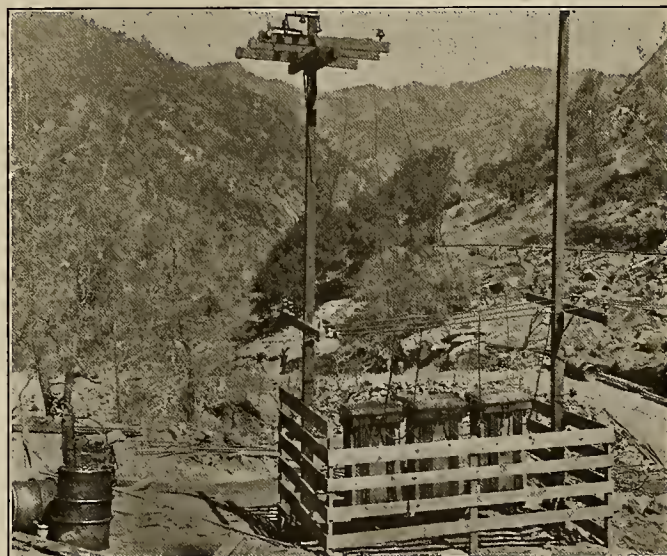
One of the outstanding features of the big work is the driving of 8400 feet of tunnel of 17 feet by 17½ feet through a mountain of solid blue granite. The roof is to be arched in solid rock, making it self-supporting. In addition to this unbroken stretch, some 9,000 feet more of tunnel will be made. The tunnel and conduit system will have a carrying capacity of 1500 second feet. Work on the tunnel is now progressing from both sides of the mountain simultaneously.

The Power House —

The power house will be the largest individual plant in the San Joaquin valley, its output of some

45,000 hp. exceeding by 5000 hp. the largest power house in operation.

The water will be delivered at a point on the mountain side above the power house into a specially constructed pipe line through which it will be dropped a vertical distance of 550 feet on the water wheels of the generating machinery. This force will



A transformer layout which supplies power for compressor plants and for electric locomotives in the tunnel

drive three 15,000-hp. vertical Francis type turbine water wheels direct connected to generators of 11,500 kva. capacity.

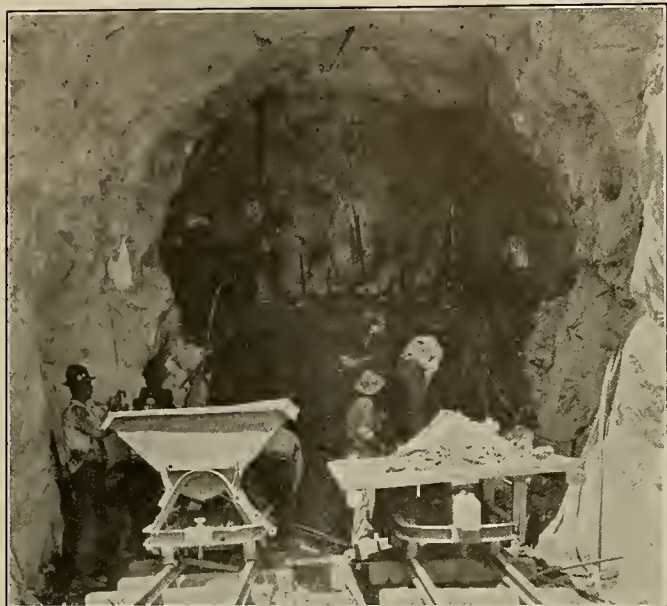
Construction Equipment —

Two electrically operated standard gauge railway hoists have been installed down the precipitous mountain slopes to bring the supplies and materials to the scene of operations. Both hoists are operated with 100-hp. electric motors.

The construction of a suspension bridge at the dam site provided means of communication with the Madera county side of the river, but as it was not suitable for the transportation of heavy materials while the rock drilling crews were at work, an aerial cable line several hundred yards in length was swung across the canyon.

Six five-ton electric mine locomotives carry rock out of the tunnel, while twenty-two auto trucks are employed to haul materials from the supply depot at Auberry, where a large warehouse has been erected.

Steam shovels and the latest type air hammer drills mounted on cross bars are used in tunneling. From four to six drills are running constantly in each head every minute of the day.



This photograph, taken in July of the present year, shows the set-up for drilling in the tunnel face

Electric power lines have been extended to the different camps and scenes of operation. Big air compressor plants driven by electric motors supply 2000 cubic feet per minute at each end of the tunnel.

Immediately above the dam a large concrete

mixer will be installed in the hillside, and the wet mixture will be poured by gravity through long conveyors to the concrete forms in the dam. The rock from the tunnel will be automatically fed into the mixer, which will have a capacity of 800 cubic yards a day.

In view of the rapid progress which the work is now making it is estimated that it will have reached completion by the scheduled time next spring. The existing power shortage in the San Joaquin valley is a special incentive for conducting the operations so intensively.



One of the compressor plants nearing completion. The compressor plants are driven by electric motors and supply 2000 cubic feet of air per minute at each end of the tunnel.

Modern Steel-Making by Electricity

BY HARRY ETHELLES

(The demand for high-grade steels is being met by increasing installation of electric steel furnaces, forecasting a change in the industry which experts declare the most radical since the time of Bessemer. In the present article, Mr. Harry Etchells sets forth many of the modern features of the Greaves-Etchells system. The conclusions drawn as to other types of furnace are his own, and are interesting as showing the difficulties which the Greaves-Etchells designers sought to overcome.—The Editor.)

In electric steel making it is now generally recognized that the contact arc furnace is the most practical type of furnace to use as a steel making instrument. This type is exemplified by Heroult, Gronwall and Greaves-Etchells systems.

Heroult System, the First Developed —

The Heroult system is the oldest and was first applied with direct current and single-phase alternating current. It consisted in the early types of connecting two carbon electrodes with the two poles of electric supply and lowering these electrodes until they maintained an arc at the tip of each electrode and between each electrode and the metal in the furnace. When three-phase power became general three electrodes were used and each connected to the three angular points of a closed Delta system. The voltage on each arc is usually from 40 to 50, and a group of three transformers is usually interposed with both primary and secondary windings connected in mesh. It will thus be seen that each of the three electrodes is in phase with one phase each of the primary supply.

It will also be realized that it is impossible to take electrical load with only one electrode in contact, and that when only two electrodes are in contact all the electrical load is pulled on two primary supply phases. The only condition of balance on the primary supply is when all three electrodes are passing equal currents and are maintained with equal volts between each electrode tip and the steel. This condition can only be maintained even approximately when all the metal in the furnace has been melted and is lying in a pool with a level surface. When this condition is reached it is generally time to consider teeming the metal, so that for the greater period of operation the phase balance is very imperfect. Further than that, the introduced reactance into the system is the only buffer against very heavy short circuits which occur when two electrodes actually make good contact with the steel. Such contact may occur when an electrode slips in its holder or when a piece of metal dislodges in the furnace and falls against the tip of an electrode, thus short circuiting the arc.

Grave Operating Difficulties —

Perhaps the greatest operating difficulty in the Heroult system is experienced by reason of the fact that when automatic regulation is used the first electrode to make contact is not arrested in its descent, as the regulator keeps on winding it down until a proper circuit load is established. This does not occur until at least one of the other electrodes establishes contact, and in the meantime it often occurs that the first electrode has broken through being powerfully forced down upon the steel scrap forming the charge. In fact, the electrical engineer will readily appreciate that all the difficulties of regulating two arc lamps in series are encountered in this arrangement, on a large scale. To the metallurgist there is confusion, because if the steel happens to be molten the leading electrode will dip into the bath and will alter the carbon contents of the steel.

Girot was contemporaneous with Heroult and he overcame this difficulty by making his steel a permanent electrical pole and each electrode an independent pole. To accomplish this he introduced water cooled steel studs which penetrated right through the hearth lining of the furnace and which were electrically connected with the transformer system. Furnace men however are not in favor of having water cooled steel studs in contact with the molten steel, and furnaces embodying this principle are not likely to find favor.

The Gronwall Furnace —

The Gronwall furnace is designed as a two-phase system. The hearth of the furnace is made comparatively thin and conductive to an electric current. It is connected as a neutral to the two-phase system and the suspended electrodes are each connected to opposite phases. As soon as one electrode touches the steel a current is passed and the electrode arc can be readily adjusted. The hearth being a neutral, it is necessary to make it very conductive to electric currents or otherwise the currents will be pushed out of phase and pass from one upper electrode across the steel to another upper electrode, giving low power factor and phase out of balance. On the other hand if the bottom is readily conductive, a very strong surge occurs if anything happens to short circuit the arc. The system is a distinct advance on the Heroult system, however, and renders the use of automatic regulators much more simple. Using a three-phase or two-phase primary supply is possible, and in the case of three-phase primary a Scott connected secondary gives a certain amount of load distribution over the primary phases and only occasionally cuts out one primary phase.

The Greaves-Etchells designers have studied all these features very carefully and their arrangements have overcome the undesirable possibilities above referred to.

Greaves-Etchells Design —

In the first place, they realized that independent regulation of the electrodes was desirable.

Secondly, that whenever a short circuit occurred on one arc of an electrode, the surge should be dis-

tributed if possible over all the primary supply phases.

Thirdly, means should be taken to check short circuit and limit surges without impairing the permanent power factor of the furnace by introducing extra reactance.

To fulfill the first two conditions they decided that the furnace must have a conductive hearth, but to assist in fulfilling the third requirement they decided that this hearth should have a certain degree of electrical resistance and should thus act as a resistance check on short circuit. If they could have made the ohmic value of this hearth resistance equal to that of one arc gap, all would be simple and they could have used a three-phase system with two phases applied through separate groups of suspended upper electrodes and one phase applied to the hearth of the furnace. Such a scheme was impracticable for many reasons, but they succeeded in elaborating something which at first sight appears very similar.

In effect they use three transformer windings. The three primary windings are connected in mesh to the three phases of primary supply.

The secondary windings are in Star, and two legs are connected to the upper electrodes while the arc is connected to the hearth. The third leg, however, which is connected to the hearth, maintains a lower voltage than either of the other two. For instance, in one furnace with the operation of which I am connected, the lower leg maintains 25 volts, while each of the upper legs of the Star transforms to 50 volts.

The results are highly satisfactory to both electrical engineer and metallurgist. It is impossible by reason of the Star delta connection to throw load off any one of the primary supply phases, however the electrodes are manipulated. When the furnace is started cold, the full proportion of current does not pass through the hearth, but at least two-thirds of the total heating capacity can be obtained from the current which circulates across the bath between the upper electrodes.

During the short period required for warming up the furnace until the hearth becomes conductive, the power factor and phase balance are necessarily imperfect.

When the furnace is at working temperature the hearth conducts current perfectly and the electrical results obtained are abnormal as compared with other furnaces of the same class.

Perhaps I can convey a clearer impression of the type of furnace by describing the actual furnace which is under my observation.

Description of Typical Furnace —

The furnace itself appears as a rectangular steel box with stout bracing all around, and of internal dimensions, 10 ft. by 12 ft. It is mounted on rockers to tilt and is rocked by two geared tilting shafts. Four steel masts are mounted on the furnace body and these form the guides and supports for independently operated carriages which travel four electrodes up and down. The electrode raising and lowering is accomplished with small electric motors and

these can be operated by push button or by automatic control.

The electrical connections of the furnace are equivalent to those of two furnaces. That is, the furnace is equipped with two banks of Star connected transformer secondaries, and the two sets of mesh connected primaries work in parallel. Thus one side of the furnace can be operated quite independently.

The three phase supply is at 2300-v., 60-cycle. The total kva. of the equipment is nominally 1300, being 650-kva. on each bank of transformers. Heavy copper conductors convey a current of 4000 amps. to each electrode and the automatic regulators can be set to maintain this amperage or any desired variation on same.

Operation of Furnace —

The splitting up into two banks of transformers precludes to a great extent a surge on the whole system, as both sides of the furnace are not likely to short circuit at once. The Delto Star grouping momentarily lowers the power factor and introduces a momentary out of phase inductance check against the short circuit occurring between any pair of electrodes. I am fortunate in being able to cite some kilowatt meter records taken with an ordinary graphic recorder. From these it was seen that steady load is established in the first fifteen minutes and then is maintained right up to maximum demand until the charge is melted. Even momentary bumps shown on the recorder do not exceed 1500 kw., while a mean load of 1300 kw. is maintained. This makes the furnace most suitable for meeting maximum demand scale power renting conditions, and further ensures the quickest possible melting with the power available, because no time is lost in breaking and re-establishing an erratic electrical load.

Metallurgists inform me that the furnace gives much better operating conditions than they have experienced with other furnaces. The lining is simple and consists of silica roof and side walls and a basic bottom. The bottom may be burnt magnesite or dolomite and this is rammed with tar. A copper plate is inserted in the bottom to make electrical contact. The Greaves-Etchell people have also developed an acid lining which by a special treatment they have made electrically conductive, so that there is no bar to adopting the system for acid or basic linings.

The operation consists in charging steel turnings, punchings, and similar scrap and melting down with lime and iron oxide. Carbon is burnt out during melting and manganese and phosphorus pass almost entirely into the slag, which is then removed.

A new slag of lime, sand and flourspar is made up and when fluid is treated with powdered coal until the slag is white and free from metallic oxides, the steel is effectively deoxidized and quiet. Both samples are taken from time to time and allow additions made at the close of the heat.

Two remarkable features are to be noted. Having charged the furnace and applied the power, the melter can sit down and quietly wait till the charge melts. It requires no poking. Secondly, when melted the metal is maintained at a uniform heat all over

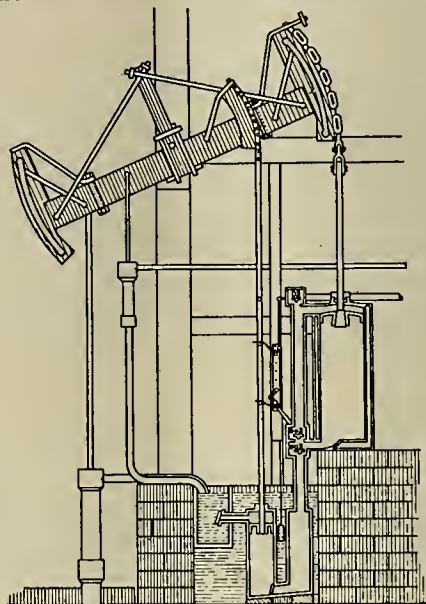
the bath and requires no stirring up. It is well known that in other furnaces the steel at the bottom of the bath is quite cold when the top metal is too hot, and enormous wear occurs on the lining in consequence.

The furnace takes about 4 hrs. to melt and 1 hr. to refine, starting with a cold furnace each morning, giving a power consumption of 900 units per ton; but with continuous operation I have no doubt that we can melt in $2\frac{1}{4}$ hrs. and conduct the whole operation for 700-kw.hr. per ton of metal melted.

ENGINEERS OF YESTERDAY—16. WATT

(Series Compiled by A. L. Jordan)

What is generally regarded as the invention which has had the greatest effect upon the history of civilization?



Watt Pumping Engine, 1769 A. D.

The invention of Watt, which was not, strictly speaking, an invention at all, may be designated as the commercial or industrial development of the steam engine.

James Watt (b. Greenock, Scotland, 1736) made acquaintance with some of the professors in Glasgow college, afterward spent some time in London, returned and became instrument maker at the college. Upon repairing a model of Newcomen's "engine," his attention was directed to its inherent defects, and soon afterward (1765) the great idea of the separate condenser came to him. This involved the addition of an "air-pump" and was followed by the double-acting engine, the principle of expansive working, the compound engine, the centrifugal governor, the indicator, the steam jacket and other improvements. His inventions in other lines include a letter-copying press, a telescopic micrometer and a machine for copying sculpture. His life represents a triumph over great poverty, business reverses and ill health.

No outline of his life would be complete without mention of Matthew Boulton, with whom Watt became associated in 1773. "Boulton was more than a man of business, he was a man of culture." "Never were two men more supplementary to each other than Boulton and Watt, and hence their success," says Andrew Carnegie in his book, "James Watt." In 1819 Watt died and at Heathfield, "in the parish churchyard, alongside of Boulton, he was most appropriately laid to rest." "Thus the two strong men, lifelong friends and partners, who had never had a serious difference, in their death were not divided."

PRACTICAL LESSONS IN ELECTRICITY

BY H. H. BLISS



Western power plant illuminated by flood lighting. This system of outdoor illumination of buildings first came into extensive use in the Panama-Pacific Exposition of 1915.

LAMPS AND ILLUMINATION



Commercial and home portrait photographers use gas filled Mazdas in deep reflectors to illuminate their subjects.

ALL sorts of lamps are used for producing artificial light, but in this country the incandescent lamp is used to a greater extent than all others combined. Until recent years the carbon filament lamp of this type was the standard, but the superior economy of metallic filaments has caused the carbon lamp

to be practically displaced by the tungsten lamp. The latter gives approximately three times as much light as the former for the same power consumption.

In lamps of medium and large size it is found that the efficiency is increased by filling the bulb with an inert gas, such as nitrogen. The ordinary tungsten lamp has the air removed, the filament being allowed to glow in an almost perfect vacuum. The gas permits the filament to be heated to a higher temperature. This means that a larger proportion of the energy expended in heating the wire is radiated off in light waves. For instance, the vacuum lamp in the 100-watt size gives only 80% as much light as the gas filled 100-watt lamp.

Lamps carrying large currents have better efficiencies than those of smaller amperage. The 200-watt 220-volt Mazda has the same efficiency as the 100-watt 110-volt lamp, and only 86% as high efficiency as the 200-watt 110-volt lamp.

Candle Power and Foot Candle.—If an incandescent lamp, hung in the usual position with base upward, gives off in a horizontal direction as much light as a standard candle, it may be called a "one candle power" (one c.p.) lamp. More accurately we say that its "horizontal power" is one. This point must be emphasized, for the amount of light sent in other directions is not the same.

If a lamp is located at the center of a globe or sphere, it sends light to nearly every point on the inner surface, but different amounts to different places. The average candle power in all directions is called the "mean spherical candle power," and it is usually considerably less than the "horizontal candle power." Ordinary lamps have a mean spherical c.p. equal to about .8 of the horizontal c.p.

If a very concentrated one c.p. light is one foot from a wall, the illumination at the point on the wall nearest is one "foot candle." Every other part of the surface is less brightly lighted, since it is more than a foot away. However, if the wall were warped so that a considerable part of it was exactly one foot from the light, the illumination would be one foot candle all over that part. A spot on a wall one



Warehouse lighted by large lamps (300-watt gas filled) at a total expenditure of .15 watt per sq. ft. What is the size of the squares into which the ceiling is divided by the lighting fixtures? What part of the light is wasted if the illumination averages one foot candle at the working plane?

foot from a lamp of 20 horizontal c.p. would be illuminated with an intensity of 20 foot candles.

For various purposes different intensities of illumination are required. In the operating room of a hospital the illumination on the “working plane” (the plane level with the table top) should be 12 or more foot candles; in a dining room 2 foot candles would be satisfactory. Following are the suggestions of various illuminating engineers for a few cases:

Auditorium	1 to 3	Lavatory	2 to 6
Cigar Store	4 to 6	Library (tables)	3 to 4
Coil Winding	4 to 12	Office	4 to 10
Department Store	4 to 10	Outdoor Construction	5 to 2
Drafting Room	7 to 12	Proof Reading	4 to 12
Drug Store	3 to 8	Residence-Cellar	0.6
Elevator	1 to 3	Residence-Kitchen	2.0
Engine Room	3 to 9	Residence-Parlor	1.5
Garage	3 to 9	Shoe Store	3 to 5
Grocery	3 to 6	Stairs and Halls	.5 to 2
Laundry	3 to 9	Telephone Exchange	3 to 9

Reflectors.—Reflectors or shades are used with nearly all incandescent lamps, though they absorb much of the light and therefore are far less than 100% efficient. A surface of porcelain over steel, which is much used in shop and factory reflectors, absorbs about 35% of the light that falls upon it.

There are two good reasons for the use of bell-shaped reflectors for interior lighting: (1) they put the greater part of the light where it is wanted and (2) they protect the eyes by making it impossible to see the glaring filament unless one looks in an unusual direction. An ordinary bare lamp throws very little light downward (past the tip), and so is very inefficient if hung vertically over the work to be lighted. Furthermore the intense light which enters the eye of a person who has a bare lamp within his angle of vision is not only annoying but also painful and injurious.

Indirect Lighting.—In some cases the reflectors are turned upside down and arranged to throw all the light toward the ceiling. Then the useful light in the room is **only** that which is reflected downward from the ceiling or from special white surfaces placed above the lamps. This is known as “indirect” or “totally indirect” lighting. Note that the reflectors are completely opaque.

The method is very considerably adopted because it gives freedom from eye strain. It requires more wattage than any other system, and tends to decrease rapidly in efficiency on account of the collection of dust. Some objection is made to indirect lighting on the ground that shadows are largely eliminated, which makes it difficult to see the details clearly. It has been claimed, however, that with the same eye fatigue from two to five times as much drafting and similar work can be done under indirect lighting as with any other artificial light.

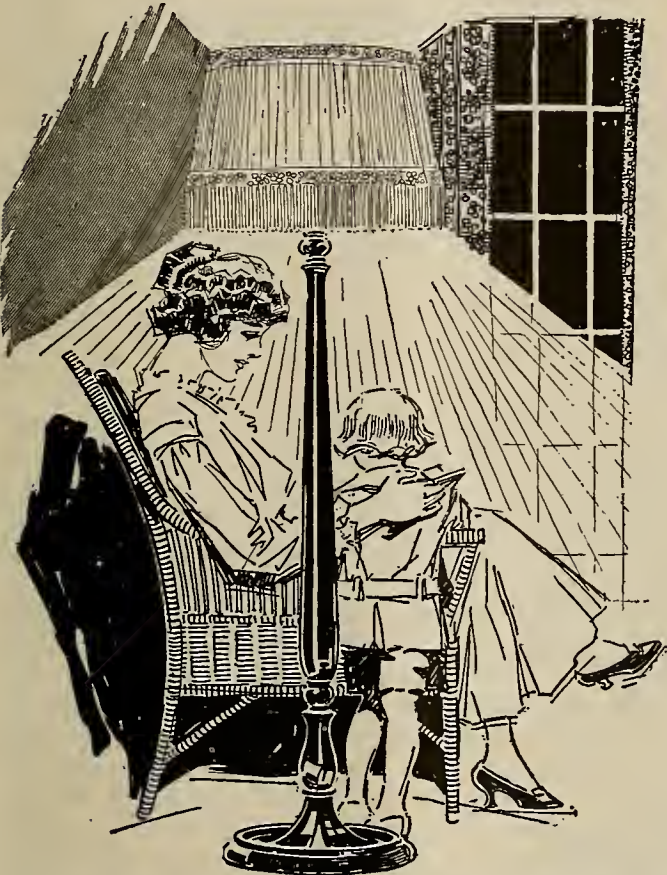
A modified method, known as “semi-indirect” lighting, is widely used. A translucent reflector is



Indirect lighting in the new and beautiful California Theater, San Francisco. Note the individual reflector for each lamp.

used under the lamp permitting a portion of the light to come through as well as reflecting much light to the ceiling. This is fairly efficient and has many advantages, but is open to some of the objections to both the ordinary and the indirect systems.

If reflectors were perfectly efficient and walls and ceilings reflected all the light that reached them, absorbing none, the total light flux from the lamps would reach the working plane. In most installations it receives only from 20 to 60% of the light emitted by the lamps.



Local lighting gives the largest proportion of the total light of the lamps at the point of use

By multiplying the required foot candle intensity in any room by the area of the working plane (which equals the floor area) we obtain a measure of the useful light necessary. This figure has to be multiplied by a factor of from 1.7 to 5 or more to find the total light the lamps must give. Below are listed some approximate factors for small rooms with light ceilings:

Reflector	Light Walls	Dark Walls
Prismatic glass bowl.....	2.7	3.0
Steel bowl (deep)	2.6	3.0
Light opal glass	3.4	3.7
Totally indirect	5.0	6.2
Semi-indirect	4.3	5.3

A 25-watt Mazda lamp has a mean spherical candle power of 17.7. If it were surrounded by a spherical shell one foot in radius, the inner surface of the shell, being one foot from the lamp, would receive an average illumination of 17.7 foot candles. As there are 12.57 sq. ft. of surface, the total light emitted by the lamp may be figured as 17.7×12.57

= 223 units. Similarly a 500-watt gas filled lamp (mean spherical c.p.=694) produces a flux of $694 \times 12.57 = 8720$.

Such numbers are found in the following table for the most common lamps:

Ordinary Tungsten			Gas Filled (Mazda C)		
Watts	Spherical c.p.	Total light	Watts	Spherical c.p.	Total light
15	10.0	125	75	69	865
25	17.7	223	100	100	1257
40	29.4	369	150	163	2050
60	45.8	575	200	232	2920
100	79.5	997	300	385	4830

What size lamp should be used in the six indirect lighting fixtures in a reading room 23 x 30 ft. with light ceiling and dark walls? Take foot candles = 3.5 by the first list; the area = 690 sq. ft., hence the useful light = $3.5 \times 690 = 2415$ units. The total light = 6.2 times this, or 15,000 units, which requires 2500 units of light from each of the six fixtures. Hence, select 200-watt gas filled lamps.

Similar calculations are made for many effective lighting installations, but the design is not generally as simple as this example might suggest. Considerations of art, utility, and the plans of the owners and architect complicate the situation, so that much study and experience are required to develop power to plan satisfactory lighting systems.

REPAIRING BOILERS OF STEAMSHIPS BY THE ELECTRIC OR OXYACETYLENE PROCESSES

The British Board of Trade has now published for official use an instruction to surveyors of vessels on the subject of making repairs to the boilers of passenger steamers by the electric or oxyacetylene processes.

The repairing of boilers of passenger steamers by the above processes has been tentatively in operation for a considerable period and, in view of the experienced gained, the surveyors are informed that, provided the work is carried out to their satisfaction by experienced workmen, these processes may be employed, within limits, for repairing cracks in furnaces, combustion chambers, and end plates of boilers, and in the same parts for reinforcing the landing edges of leaky riveted seams which have become reduced by repeated chipping and calking.

It has also been noticed that a shell plate of a cylindrical marine boiler cracked recently through a solid part where some surface welding had been done by the electrical process two years ago. The welding had extended for a length of about 12 inches along the outside calking edge of one of the middle circumferential seams at the bottom of the boiler, the leaky edge of the seam and the adjoining shell plate having been covered (soldered) by metal deposited by this process in the usual way. The shell plate was 1 5/32 inches thick and the crack, which followed the line of surface welding, extended in a circumferential direction for a distance of 2 feet 9 inches, the welded part being situated midway along the crack. No welding should be done to these parts by any process which may cause local heating over an appreciable area of the plate, such as the oxyacetylene, oxyhydrogen, or other similar methods.

FUEL OIL AND STEAM ENGINEERING

(The indispensable part which oil plays in modern industry emphasizes the importance of any device by which it is rapidly and cheaply made ready for use. That the necessary process of dehydration can be accomplished by electricity with remarkable efficiency and economy, is shown in this discussion of electrical dehydration by the Commercial Engineer of the Southern California Edison Company.—The Editor.)

ELECTRICAL DEHYDRATION OF OIL

BY H. N. SESSIONS

Electrical dehydration, or the removal of water from crude oil by electricity, is so far advanced in every respect as compared to other methods of separating water from crude oil that its adoption is virtually a necessity.

The separation of water from crude oil can also be accomplished by the application of heat, centrifugal force, or by chemical action. Prior to the supremacy of electricity being established in the dehydration of oil, the treatment by heat was the one commonly employed. Petroleum producers have wrestled with the problem of removing water from crude oil ever since oil was discovered.

Appearance of Water in Crude Oil

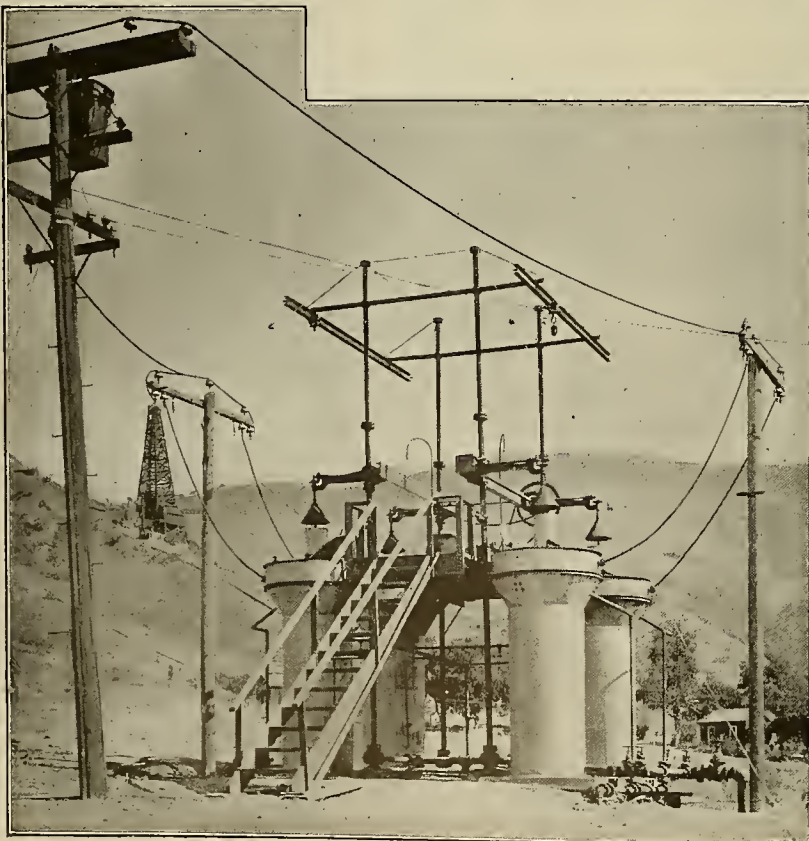
The presence of water in crude oil is natural and inevitable, and is caused by the infiltration of water into the strata of oil bearing sands. A mixture of oil and water is always encountered to a greater or lesser extent. Water may be present in crude oil in the form of large free globules which will settle out in time if allowed to stand, due to their greater specific gravity, or small particles of water may be held in suspension or trapped in emulsion with the

oil, and these will not settle out at normal temperatures and pressures even if the mixture is allowed to stand indefinitely.

The weight and volume of the water particles carried in suspension depends upon the viscosity, temperature and gravity of the oil, hence there is no fixed ratio between the water held in the free globules and that contained in the particles of water in emulsion. Some producers dispose of their crude oil without extracting the water from it and the purchaser is allowed a rebate on the percentage of water he is able to prove the oil contains. Such practice is characteristic of the early-day wastefulness in the oil fields when little regard was given to economy and efficiency in the handling and marketing of crude oil.

Economies of Immediate Dehydration

Not to dehydrate at the wells works an injustice to all concerned. The carload freight rate on crude oil from Taft to Los Angeles is 52 cents per barrel and the shipment of a 12,500-gallon car of un-dehydrated oil which carries 35 per cent water in emulsion, means that somebody must needlessly stand the expense, amounting in this case to about \$49.00, for the transportation of about 4,000 gallons, or 30,000 pounds of water in this car. This cuts down the useful capacity and purpose of expensive and needful



The usual electrical dehydrating plant is made up of four treaters and operates on a single-phase alternating current at a pressure of 11,000 volts. It treats oils of different grades at the same time without in any way impairing their efficiency, and with practically no loss of gasoline. The electrical process leaves the oil its natural color, while the heating process impairs its market value by discoloring it. Oil containing eighty-five per cent emulsion has been successfully dehydrated electrically.



The installation of electrical dehydrators at the wells results in a tremendous saving in transportation costs. The shipment of un-dehydrated crude oil involves the unnecessary expense of paying heavy freight charges for large quantities of water in emulsion. Immediate electrical dehydration is not only more efficient but more economical than the older method.

rolling stock and really makes the actual freight cost of the oil delivered, less the water, six cents per barrel, when the oil could be dehydrated electrically before shipment, including all costs and royalty, for less than two cents per barrel with electricity at two cents per kilowatt-hour.

There are seventeen electrical dehydrating plants now operating in the Whittier district. The first electrical dehydrator was installed by the Standard Oil Company in 1913, on the Murphy-Coyote lease. The oil companies using the electrical equipment are enthusiastic over the results obtained and in many cases oil heretofore unfit for use and rebellious to other methods of dehydration is made marketable by the process of electrical dehydration.

No Loss of Gasoline

The oil treated in the above mentioned seventeen plants ranges from 15 per cent to 50 per cent water and the average amount of oil net after treating is approximately eighteen barrels per kilowatt-hour, or one-ninth of one per cent per barrel for electricity at the rate of two cents per kilowatt-hour. Electrical dehydration causes practically no loss of gasoline and the records show that after treatment the gravity of the oil has been raised from one to two degrees and has in consequence an increased market value. This increase in market value in some cases is enough to pay the cost of dehydrating. The opposite is true in the heating process, because crude oil containing any appreciable gasoline will suffer evaporation under the temperature necessary to break down the emulsion, and naturally the loss of gasoline means less dehydrates, less gravity and less market value.

The heating process necessitates close watchfulness; the electric, practically none. The heating process discolors the oil, impairing its market value; the electric dehydrator clarifies the oil, leaving its natural color. The low fire hazard with electricity is important.

Savings in Time and Cost

A record run of 7,000 barrels of the same grade of crude oil was made, first by the heating process, then by the electrical. Eighteen hours was required with heat and only 7.5 hours with electricity, the net

amount of oil being 5,060 bbls. with the former process and 5,160 bbls. with the latter. The total cost by the heat process for this run was \$387.00, or seven and one-half cents per barrel, while the entire expense with electricity, even including a royalty of half a cent per barrel, was \$102.00, or slightly less than two cents per barrel.

The electric dehydrator effectively treats oils of different grades at the same time without in any way impairing their efficiency. On a test, 28 gravity crude oil containing 25 per cent emulsion at a temperature of 78 degrees, was cleaned simultaneously and separately with 13 gravity oil containing 30 per cent emulsion at a temperature of 180 degrees, by the same electric dehydrator, and the dehydrates showed only 1.3 per cent water and foreign matter in suspension, a limit of 2 per cent being permissible.

Oil containing eighty-five per cent emulsion has been successfully dehydrated electrically. The Quintuple Oil Company in the Whittier district electrically dehydrates oil as it comes from the well from a mixture of twelve per cent water to only one-tenth of one per cent.

The Electric Dehydrating Plant

The electric dehydrating plant is made up of units called treaters and the usual size is a four-treater plant and the cost installed is about \$2,000 per treater. The cost of installation is generally borne by the oil companies and the ownership of the dehydrator is retained by the manufacturers, who also exact a royalty from the oil companies on each barrel of dehydrate produced.

There are several successful electric dehydrators on the market now, the one most used being manufactured by the Petroleum Rectifying Company of California. This company claims to have placed machinery which is now cleaning about two million barrels of emulsion per month. In general, the electric dehydrator operates on a single-phase alternating current at a pressure of 11,000 volts, the voltage being stepped up from our regular service of 440 or 2200 volts. The emulsion is passed between highly charged electrodes and in this electrostatic field the small globules and particles of water, by static attraction for each other, form in chains which in turn

coalesce into free water which readily settles to the bottom of the treater and is drawn off. In certain leases where water is very scarce, the water electrically removed from the oil is of considerable value.

Due to the condenser effect caused by the highly charged electrodes, the electric dehydrator operates at about 98 per cent leading power factor. The average maximum demand is four kilowatts, the average load factor fifty per cent and the average gross income is approximately \$25.00 per month. This is small but important, as the actual necessity for electrical dehydration is being the means of our electri-

fying entire leases where electricity is being used for other purposes.

The great war has forced us to realize the necessity of thrift and economy in every line of industry, and especially in the conservation of our natural resources, and second to none of these is oil. From the foregoing, it can be readily seen that the dehydration of oil by electricity is not only an economic essential to the producer and the consumer but to the welfare of the nation as well. The producer is fully realizing the absolute need of the electric dehydrator and the near future will see that he is not without it.

Pulverized Coal as Fuel

(The fact that lignites can be utilized best in pulverized form makes the much-discussed question of powdered coal one of particular interest to the Pacific Coast states, which produce mainly lignites. The Northwest has been using powdered fuel with marked success, and the following discussion presents further information on its advantages. The data is extracted from a paper by N. C. Harrison, recently read before the American Society of Mechanical Engineers at Detroit.—The Editor.)

Pulverized coal was first used in the United States about twenty-six years ago for the economical burning of the cement rock in the rotary kilns of the portland-cement industry. The application of this form of fuel has been gradually taken up by engineers connected with other industries, and today a large amount of pulverized coal is used in the steel and copper industries and in rotary kilns other than the cement industry. It is used with great success in the open-hearth steel plant of the American Iron & Steel Manufacturing Company of Lebanon, Pa., having many advantages over producer gas as a fuel for open-hearth furnaces. In the operation also of stationary boiler plants it has been found to possess many desirable features.

The results of a test of a 468-hp. Edge Moor boiler with pulverized coal equipment showed a greater net efficiency than was found in a stoker-fed boiler in the same plant.

1. Fuel Preparation Costs —

a The cost of crushing the coal. This expense is the same for pulverized-coal equipment as for stokers.

b The cost of drying and pulverizing the coal. Although no cost records are available at present, it is estimated that 32 cents per ton will cover this preparation cost on a 200-ton-per-24-hr. plant using bituminous coal containing about 12 per cent moisture.

c The maintenance costs of the drying and pulverizing plant. This unit has not been determined from actual experience; however, it is estimated that 3 cents per ton will cover the maintenance. In stoker practice the maintenance cost per ton of fuel fired is close to 5 cents per ton.

Summarizing the above facts it is evident that, with fuel at \$5 per ton, the gross efficiency shown by the pulverized-fuel boilers will have to exceed that shown by the mechanical-stoker-fired boilers by 6 per cent in order to offset coal-preparation costs. A 6 per cent deduction from a gross efficiency of 85.22 per cent results in a net efficiency of 79.22 per cent for the powdered-coal burner. In stoker practice the maximum attainable gross efficiency at any of our plants has been 80.54 per cent. Deducting the 2.5 per cent for auxiliary uses, the resulting net efficiency is 78.04 per cent, which is lower by 1.18 per

cent than the figure obtained in pulverized-fuel practice.

2. Miscellaneous Advantages Resulting From the Use of Pulverized Fuel —

a Continuous boiler operation at a uniform rating as well as a constant efficiency is made possible. At no time is there a loss in capacity due to the clinkering of coal on the grates or the cleaning of fires, as is the case in stoker practice.

b Heavy overloads can be taken on or dropped off in a very brief time through adjustment of the coal feeders and the furnace drafts.

c From 97 to 98 per cent of the combustible in the coal is utilized, regardless of the quality of the fuel.

d The ash-handling costs are reduced to a minimum due to the reduced volume.

e The banking conditions when operating with pulverized coal are somewhat different from those obtained in stoker practice. By stopping the fuel supply and closing up all dampers and auxiliary air inlets a boiler can be held up to pressure for about 10 hours. The furnace brick work having been heated to incandescence during operation gives off a radiant heat which is absorbed by the boiler rather than being sent out through the stack. The ease of controlling the fuel, feed and drafts, the ability to take on heavy overloads in a brief time, the thorough combustion of the coal and the uniform high efficiency obtainable under normal operating make pulverized coal a most satisfactory form of fuel for central station uses.

The full story of maintenance expense is only partly known as yet, however. Indications are that no unusual difficulties will be met. The cost of fuel preparation and labor for operating a boiler room fully equipped with pulverized-coal-burning boilers will be a question for the engineer to decide for himself according to his particular conditions. If properly installed with respect to capacity of storage, size of drier and pulverizers, and on a sufficient number of boilers to properly and fully employ the minimum number of men, the pulverized-fuel installation will undoubtedly be more advantageous. The main item that must be borne in mind by engineers is that the ease with which a high efficiency is obtained and the constant nature of that efficiency, as compared to the lack of constancy of efficiency in a stoker-fired boiler, unless very closely supervised, is the one factor about the burning of pulverized fuel which justifies its use. There is no doubt that with a well-

equipped plant burning pulverized fuel, having all the necessary recording and indicating instruments to guide the operators in maintaining the proper conditions, a lower cost of generating steam will be possible than has heretofore been the case in any type of equipment.

LOG OF TEST OF A PULVERIZED-FUEL-BURNING STATIONARY BOILER. DATE, AUGUST 12-13, 1918.

Make of boiler.....				Edge Moor
Rated hp.....				468
Heating surface, sq. ft.....				4685
Time fired or test started.....				11:15 a.m. 8/12/18
Time fire out or test finished.....				11:15 a.m. 8/13/18
Duration of test.....				24 hr.
	Maximum	Minimum		Average
Temperature of boiler room (deg. Fahr.).....	99	85		93.3
Temperature of feedwater.....	168	135		157.2
Temperature of steam (deg. Fahr.).....	477	427		448.7
Barometer in. of mercury.....	29.35	29.20		29.25
Temperature of flue gases (deg. Fahr.).....	515	455		495.3
Average boiler pressure, lb.....				167.0
Atmospheric pressure, lb.....				14.4
Temperature of steam, deg. Fahr.....				373.8
Superheat, deg. Fahr.....				74.9
Safety valve set for, lb.....				175
Fuel fired per hr., lb.....				1,990.6
Total fuel, lb.....				47,775
Total water, lb.....				393,168
Water apparently evaporated per hr., lb.....				16,393.0
Water apparently evaporated per lb. of coal, lb.....				8.23
Factor of evaporation.....				1.1502
Water evaporated from and at 121 deg. Fahr. per lb. of coal.....				9.47
	Maximum	Minimum		Average
Carbon dioxide (CO ₂) per cent.....	15.4	12.2		13.85
Oxygen (O) per cent.....	5.6	3.2		4.38
Carbon monoxide (CO).....				None
Fuel used.....				Bituminous screenings
Amt. of coal represented by each sample, lb.....	19,775	20,000	8,000	.....
Per cent of total.....	41.3	41.1	16.9	.....
Moisture (per cent).....	10.3	11.0	9.7	10.49
Volatile (per cent).....	33.81	36.96	38.77	35.96
Fixed carbon (per cent).....	50.43	49.13	48.29	49.53
Ash (per cent).....	14.36	13.91	12.94	13.93
Sulphur (per cent).....	1.90	2.06	2.12	2.04
B.t.u. as received.....	10,600	10,763	11,263	10,779
B.t.u. dry.....	11,817	12,093	12,473	12,045
Vacuum in burner, in.....				0.000
Vacuum under primary arch, in.....				0.000
Vacuum in combustion chamber, in.....				0.000
Vacuum in first pass, in.....				0.000
Vacuum in second pass, in.....				0.005
Vacuum in breeching, in.....				0.09
Pulsation.....				None
Feeder speed, r.p.m.....		No. 1, 53.6; No. 2,	50.7	
Coal per rev. of screw, lb.....				0.318
Accumulation of slag on tubes.....				None
Flues blown during test.....				5 times
Operation of furnace.....				Very satisfactory
Pulsation.....				None
Condition of smoke.....				Light
Heat effect on brick.....				None
Back lash of flame in burner.....				None
Pounds of steam per hr. from and at 212 deg. Fahr.....				18,842.6
Horsepower.....				546.2
Per cent of rating.....				116.7
Boiler efficiency, per cent.....				85.22

SIMPLE DEVICE DETERMINES PHASE ROTATION

BY W. C. HESTON

(A contrivance for overcoming one of the various small operating difficulties experienced by central stations.—The Editor.)

The need for a simple device for determining phase rotation has long been felt by companies operating distribution systems.

It is often inconvenient, and sometimes impossible to find a motor which can be started, to determine whether the direction of rotation is correct, when transformers are replaced or moved, or when some line or sub-station changes are made, especially when such changes are made on Sunday, as is nearly always the case.

By means of the device shown in the photograph herewith, and an ordinary voltmeter, the relative direction of phase rotation, on independent circuits, or on the same circuit before and after changes have been made, is easily determined.

Details of Construction —

This device consists of a noninductive resistance coil, and a highly inductive coil, connected in Y, with

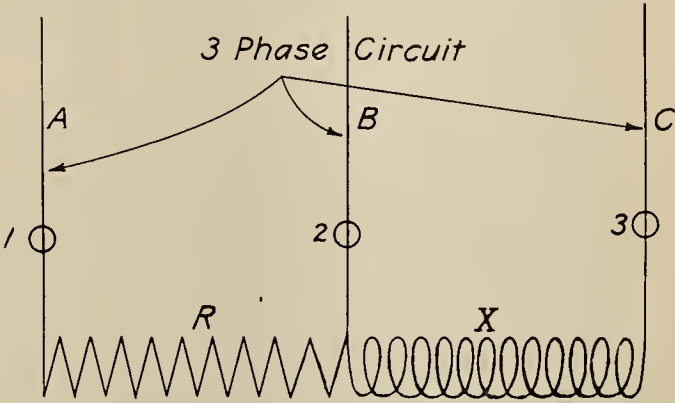


Figure I

Diagram showing how the device for determining phase rotation is connected to a three-phase circuit

an ordinary voltmeter, and placed across the three phases of a three-phase circuit.

The resistance coil consists of four resistances taken from a portable voltmeter box, and the reactance coil consists of 600 turns of No. 22 wire wound

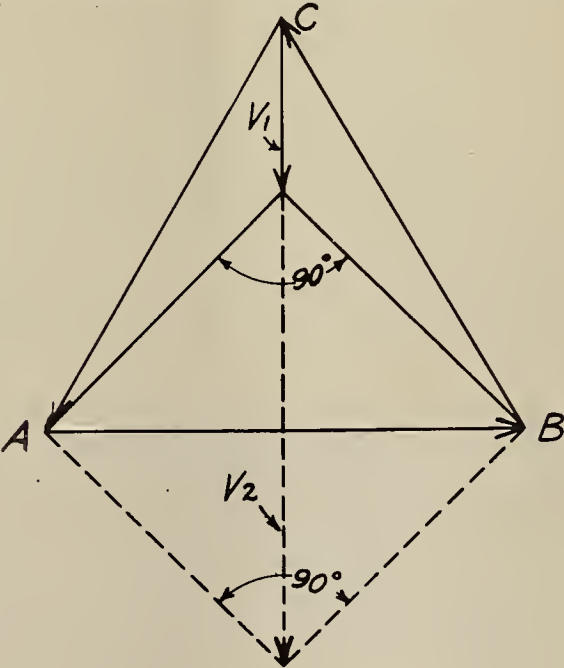


Figure II

Diagram showing principle of operation. With one direction of rotation the voltage V-1 is obtained, and with the other direction of rotation the voltage of V-2 is obtained.

on a laminated iron core having a cross-sectional area of one square inch.

The resistance coil has a resistance of 140 ohms, and the reactance coil has an impedance of 75 ohms. The impedance of the reactance coil should really be equal to the resistance of the resistance coil, but the device works equally as well with the above values of resistance.

To Use the Device —

Figure I shows how the device is connected to a three-phase circuit, and Figure II shows vectorially the principle of operation. With one direction of rotation the voltage V_1 is obtained, and with the other direction of rotation the voltage of V_2 is obtained.

To use the device it is then only necessary to note whether the voltmeter gives a reading above, or below, the normal voltage of the circuit.

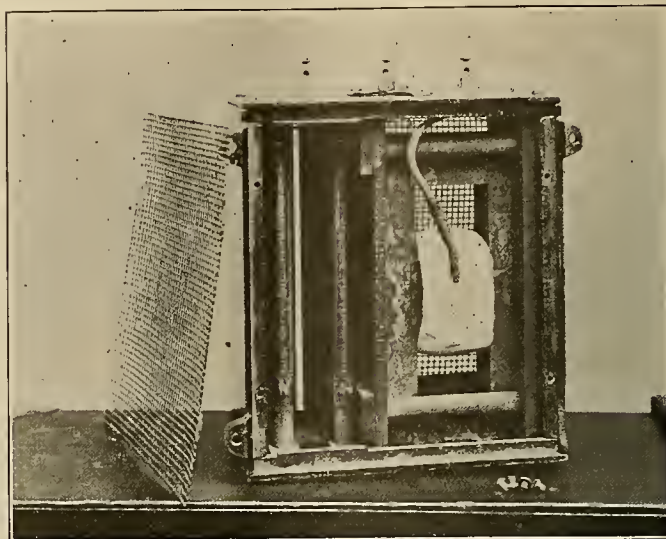
If a low reading is obtained before the changes are made, and a high reading afterward, the direction of phase rotation has been reversed.

In making a series of tests, care must be taken to have the same side of the instrument facing the observer on all tests, and to have the leads from the instrument to the circuit being tested, run in exactly the same manner in each case, as turning the instrument around, or crossing the leads, will compensate for a reversal of phase rotation.

Field of Application —

The device can be used on the secondary of 50-watt 110-volt potential transformers, or on 220 and 440-volt three-phase circuits. When used on 220 and 440-volt circuit the current taken will be two and four times the current respectively taken when used

on 110-volt circuits. The high current taken when used on the 220 and 440-volt circuits is of little con-



This device consists of a non-inductive resistance coil and a highly inductive coil, connected in Y, with an ordinary voltmeter, and placed across the three phases of a three-phase circuit.

sequence, however, as it is necessary to have the instrument in the circuit only a few seconds when making a test.

Library Service in a Business Organization

BY T. D. SCHAFTCHENKO

(The practical service of the business library and the invaluable part which it plays in keeping all branches of an organization in touch with current developments is strongly brought out in this account of the actual working of the library of a large electrical concern. Following the series by Louise B. Krause on the Business Library, this article is particularly appropriate as illustrating the definite success which has attended ventures of this kind.—The Editor.)

The library of the National Carbon Company, Inc., Cleveland, is operated on a distinctly individual plan and employs a system which will prove interesting to the many persons confronted by the prob-



The circulation room is headquarters for the library's effective system of handling requests for special material, and is one of the busiest rooms in the office.

lems of the special library. The plan incorporated here is the outcome of the endeavor to be of the greatest service to the greatest number of persons. In the formulation of this plan it was necessary to

bear in mind the problems of the numerous company plants scattered throughout the country and also the means of serving these plants.

The library is an adjunct of the Publicity Department, a department whose duty it is to keep all of the various units of the company informed as to new methods of manufacture, expansion of trade, newly derived uses for the products made, data on what competitors are doing, and all new literature on subjects pertinent to the company's activities. The library contains approximately 4000 volumes of the latest literature pertaining to the manufacture of carbon and the allied industries. The technical journals pertaining to the carbon industry are also bound and form a part of the collection of books. The company subscribes to approximately 110 technical, trade and business papers. Of some of the important publications a number of copies of each issue are bought to take care of the demand.

The Weekly Index —

One of the special features of the library service is the publication of the Weekly Periodical Index and Review. This Weekly Index, as it is generally called, contains a record of all of the articles of interest to the company which have appeared in the current trade and technical magazines to which the company subscribes. It further contains a list of new books,

pamphlets and patents received. The Weekly Index is sent regularly to any employe of the National Carbon Company upon request to the Publicity Department. At the left of the sheet, space is provided for filling in the name and the department of the person receiving the Index. After checking the articles desired the Index is returned to the Publicity Department where the proper records are made, after which the Index is again returned to the sender.

As the magazines come in they are distributed by the Circulation Department to the persons requesting them, giving preference to persons most vitally interested in the information contained in the magazine. A list is made of all inquiries for magazines or articles noted on the Weekly Index and where there are several persons waiting for the same item it is sent to each in turn. This list is termed the "waiting list." After the magazines noted have been circulated to all wishing to see them and are returned to the librarian, all the articles noted are filed according to a special decimal system which was designed to meet the particular requirements of the carbon industry. The articles in magazines which are not bound are clipped and filed and are cataloged on large manila cards so that any one article can be quickly located. Also if at any time all of the miscellaneous articles under any one heading are to be reviewed it is possible to locate them all together.

The Mailing List —

A separate list is kept of all persons desiring to receive certain magazines regularly. This list is termed the "mailing list." This list is carefully selected and includes only those persons who, because of their type of work, would be expected to keep in touch with the particular publication in question. The person whose name is on the mailing list for a certain magazine will receive this magazine regularly without checking it on the Weekly Index. Anyone may have his name put on the mailing list for any magazine by notifying either the librarian or the Publicity Department to this effect. The mailing list, however, applies to magazines only. All magazines may be kept for one week excepting those which have a very large circulation. In this case magazines may be kept only four days and are distinguished from the other periodicals by a red label pasted on the front cover.

Circulation Room System —

The circulation room is one of the busiest rooms in the entire office. The clerks in this department, under the supervision of the librarian, send out on an average 700 magazines, 100 books and 50 patents weekly. This entails an almost endless amount of work. It means card indexing all of the requests for articles which come in on the Weekly Index; it means making cards and pasting pockets in all of the magazines; sending out indices, checking in the magazines, books and patents. On each magazine is pasted that part of the Weekly Index which has reference to its contents.

Using the Public Library —

The Publicity Department has special membership cards for both the Cleveland Public Library and the Case Library on which books may be drawn in

the regular way. Lists of all the magazines and periodicals received regularly by both these libraries are on file in the Publicity Department. The Industrial Arts Index, a series supplied by a New York

To Publicity Dept.	NATIONAL CARBON COMPANY, INC.		Page
	WEEKLY PERIODICAL INDEX AND REVIEW		
	JUNE 8, 1918		
	AMERICAN ELECTROCHEMICAL SOCIETY—Advance Paper		
	12. The Vom Baur Arc Furnace—J. H. Vom Baur. (Description of a new design of electric furnace particularly designed for melting ferro-manganese or ferro-silicon, or melting down cold charges for steel castings.)		
	AMERICAN MACHINIST—May 30, 1918.		
	Employment of Women in Our Industries—W. A. Viell. (The experience of one of the major shops of this country in the employment of women.)		909
	Report of A. S. M. E. Committee on Limits and Tolerance in Screw Thread Fits. (A comprehensive report which would interest the machinist.)		913
	AUTOMOBILE TOPICS—June 1, 1918.		
	Thompson Electric Clocks Need No Winding. (Uses dry cells or storage battery.)		355
	AUTOMOTIVE INDUSTRIES—May 30, 1918.		
	Nomography—F. L. Martineau. (Contains bibliography on methods of making alignment charts.)		1045
	COMMERCIAL VEHICLE—June 1, 1918.		
	Baker-R. & L. Offers Complete Line of Electric Industrial Vehicles. (Trade note.)		29
	ELECTRICAL WORLD—June 1, 1918.		
	Sudden Short Circuits of Alternators—N. S. Diamant. (Thorough and critical exposition of electromagnetic phenomena. Practical methods of calculating characteristics.)		1126
	The New Westinghouse Research Building—C. E. Skinner and R. W. E. Moore. (Short general description.)		1132
	Protective Lighting for Industrial Plants—D. H. Tuck. (Discussion regarding the intensity and distribution of illumination required, avoidance of glare, available units and most desirable methods of installation.)		1137
	ENGINEERING & MINING JOURNAL—June 1, 1918.		
	The Advent of Modern Mill Mechanism to Nitrate Leaching—D. F. Irvin. (Higher extractions made possible.)		987
	Quality of Batesville, Ark., Manganese. (Analysis of different grades given.)		996
	The American Zinc Industry. (Organization to promote the welfare of industry considered.)		1018
	ENGINEERING NEWS-RECORD—May 30, 1918.		
	Trucks on Concrete Roadways Distribute Supplies—C. M. Buck. (Handling stores by storage battery tractors and trailers at railway shops.)		1038
	IRON AGE—May 30, 1918.		
	How Erie Is Solving the Housing Problem. (Home-building work being carried out by the General Electric and American Brake Shoe & Foundry Companies.)		1385
	Electric Steel for Small Castings—R. F. Flinterman. (Improved operating methods and furnace construction—Heat treated alloy castings in place of forgings—Reversed duplexing.)		1398
	The Most Economical Production Lot—E. W. Taft. (Formulas for exact and approximate evaluation—Handling cost of jigs and interest charges of product manufactured included.)		1410
	Tin Shortage Compels Regulation of Uses. (Exports of tin plate for containers limited to those for food—Conserving tin in electrical and other manufactures.)		1420

This weekly index lists all the articles of interest to the company which have appeared in technical magazines to which the company subscribes

organization which lists all important articles in practically all of the important trade and technical periodicals, is also subscribed to. Articles which are especially pertinent to the company's activities appearing in the Industrial Arts Index are added to the Weekly Index periodically. The monthly numbers of the Engineering Index section of the Mechanical Engineering Magazine are kept on file in the library, also the annual numbers from 1907 to date. These two indices form a valuable guide to the periodical literature on technical subjects.

Cooperation with the Publicity Department —

The most important work of the library is assisting the members of the Publicity Department in collecting and tabulating information for the various departments of the organization, in preparing articles for trade papers, and other work of similar nature. It is often necessary for the librarian to ask the assistance of the members of the Publicity Department when the information asked for is of an extremely technical nature. Much of this work of supplying information to the laboratories is done by mail. Hardly a day passes but one of the laboratories located outside of Cleveland writes in for technical information. Salesmen on the road are continually asking for data on this or that subject and every effort is made to supply the necessary information. The Employment Departments make good use of the material available.

SPARKS—Current Facts, Figures and Fancy

(Do you know what a Genoese does when he gets a raise in salary? Which is the highest telephone in the world? How much of the world's shipping does the United States produce? Besides answering these questions, the miscellanea here given report a new use for bad odors, a new application of wireless, and a community venture in the newspaper field.—The Editor.)

A telephone at an altitude of 14,960 feet, located in an observatory on the summit of Monte Rosa in Italy, is said to be the highest telephone in the world.

* * *

Telephone officials in England have decided to expend \$25,000,000 on automatic telephones in the London district. Some \$50,000,000 will be spent altogether on telephone improvements in London.

* * *

The completion of wireless stations in Oxfordshire, England, and in Egypt is provided for by a recent vote of the British House of Commons. This will be the first connection in a wireless chain linking up the entire British Empire.

* * *

On June 30 last the amount of tonnage under construction in the shipyards of the world was 8,017,767. Of this 3,874,143 was being built in the yards of the United States and 2,524,050 in those of Great Britain. No other country was building as much as 300,000 tons.

* * *

The ranks of the capitalists have recently been augmented in an interesting way in Genoa. The longshoremen of that city struck for, and obtained, the equivalent of \$6.50 per day. They promptly hired other men to do the work at \$2 a day and set about enjoying their blissful leisure with the remaining \$4.50.

* * *

The system of blue lights provided on a Brazilian battleship, launched some years ago, was adopted to some extent by the United States for use when near the enemy at night. The reason for this is that blue has a very low range in comparison with light of other colors, red and yellow rays being far more penetrating.

* * *

Recent reports as to the practicability of delivering American coal to Great Britain seem to be unfounded. According to the latest advices the cost of American coal delivered in European ports is at the present time higher than the corresponding price for British coal on account of the higher rates of freight from America.

* * *

A community-owned newspaper is a successful venture in operation at Bellingham, Wash. The residents of the city and adjacent territory have subscribed for a non-dividend-paying certificate in the publishing company, which is not operated for profit. The executive work is done by two trustees and a managing editor, all elected by the certificate-

holding membership. The object is to acquire independence in the newspaper field.

* * *

An unpleasant but effective safety device has been developed by the United States Bureau of Mines. It consists of a vapor with an ultra-offensive odor mixed with the air which is forced through the mine for ventilating purposes. This reaches every corner of the mine far more rapidly and effectively than could any other form of danger-signal.

* * *

A substitute for a pilot was developed during the war by utilizing electro-magnetic effect in connection with a cable. The cable is laid on the bottom of the sea, along the course of the safe channel leading to the harbor, and when an alternating current is passed through it, it is possible by means of delicate devices installed on a ship to obtain indications of the presence of the cable, and steer the ship safely through fog or darkness.

* * *

The quantity of water lost by evaporation in the Panama Canal Zone is nearly as great in the four dry-season months as in the whole eight-months period of the rainy season. The record daily loss from Lake Gatun is 0.4 in., in March, 1918. Sixty per cent of the evaporation loss occurs between 8 a.m. and 8 p.m. The loss from surface along the timber-covered margins and the grassy marshes is far less than that from the open sections of the lake.

* * *

Conducting aluminum is a new invention by a Swiss expert. It is produced by putting the ordinary aluminum through a specially patented process, by which it acquires the same mechanical qualities and capacities as bronze, copper and brass, without changing its specific weight. It is expected that its smaller specific weight will permit it to compete favorably with copper and brass, and the fact that it is a conductor will make it particularly in demand in the electrical trade.

* * *

Getting married by wireless while in an aeroplane 2000 feet above the earth is the recent experience of a bridal couple. The minister and the best man occupied one plane and the bride and bridegroom another, while the bridal party below were provided with telephone receivers by means of which they followed the entire ceremony. The best man and the bridegroom acted as pilots, and the minister and the bride operated the wireless sets. The planes flew within 50 to 100 feet of each other.

PERSONALS

I. W. Alexander, of the commercial department of the San Joaquin Light & Power Corporation, has accepted the position of chairman of the Publicity Committee of the Pacific Coast Section, N. E. L. A. The active part taken by Mr. Alexander in the publicity work of the California Electrical Cooperative Campaign as well as his constructive assistance in all N. E. L. A. convention activities has undoubtedly led to this appointment, which will mean much to the electrical industry of the Pacific Coast. The committee which will act un-



der Mr. Alexander consists of Howard Angus, secretary of the California Electrical Cooperative Campaign; F. E. Boyd, in charge of the small motors department of the San Francisco office of the General Electric Company; M. T. Dolman, manager of sales promotion of the Pacific States Electric Company, San Francisco; Carl M. Heintz, of the publicity department of the Westinghouse Electric & Manufacturing Company, Los Angeles; F. S. Myrtle, manager of the publicity department of the Pacific Gas & Electric Company, San Francisco; C. A. Peirson, advertising agent of the Southern California Edison Company, and Robert Sibley, editor of the Journal of Electricity and Western editor of the Electrical World and Electrical Merchandising. The committee under Mr. Alexander's leadership has already planned an important program for bringing the electrical industry of the West to the favorable attention of the public in this region, as well as to Eastern capital.

Herbert Hoover, who returned from Europe recently, is now at his residence in Palo Alto, California.

F. E. Bonner, electrical engineer with the Forest Service, Washington, D. C., has recently been spending some time in San Francisco.

Wm. H. Easton, publicity representative for the Westinghouse Electric & Manufacturing Company at New York City, and Waldo C. Cole, commercial engineer for the same company in the Southwest, are among recent San Francisco visitors.

C. E. Heise, district manager for the Westinghouse Electric & Manufacturing Company at San Francisco, and K. E. Van Kuran, district manager at Los Angeles, are attending a meeting of the company's district managers at East Pittsburgh, Pa.

Ronald T. Strong, formerly with the valuation department of the Portland Railway Light & Power Company, and more recently a lieutenant in the U. S. Navy, has accepted a position as industrial salesman with the Westinghouse Electric & Manufacturing Company, with headquarters in Chicago. He will handle the iron and copper mining customers in northern Michigan.

J. P. Growdon, who left a position as district superintendent with the Northwestern Electric Company at Portland to go to the first officers' training camp, has brought back a most creditable record. He applied at the training camp for the rating of first lieutenant, on completing his training period was assigned at once to the Fourth Engineers, and went with them to France as captain. After earning four

stars in his service medal, signifying that he fought in four major offensives, he returns as a major, and unknown to all his friends is wearing both the Distinguished Service Cross and the Croix de Guerre. He was honorably discharged on September 10 and immediately resumed work in the engineering department of the Northwestern Electric Company at Portland.

E. Cantelo White has been appointed manager of the newly-organized lighting department of the Western Electric Company. Mr. White has had wide experience in the electric lighting field, and is well known to the electrical industry as the originator and designer of the Duplexalite line of lighting fixtures.

Calvin W. Rice, secretary of the American Society of Mechanical Engineers, has accepted appointment on the Organizing Committee to plan for the Inter-Professional Conference. It is proposed to hold this conference towards the end of the year, bringing together representatives of the professions to consider inter-professional relations and problems, and to further cooperation. Mr. Rice recently spent some time on the Pacific Coast in the course of an extended trip. He visited the various local branches of the A. S. M. E. throughout the country, with a view to bettering the affiliations.

John B. Fiske, superintendent of light and power with the Washington Water Power Company, Spokane, Wash., has been down to Los Angeles to attend the recent Pacific Coast Convention of the A. I. E. E., acting as chairman of the gathering. Other visitors to the convention from outside cities included F. M. Feiker, editorial director, McGraw-Hill Company, New York; J. H. Danderton, Boston; Jasen Carey, Santa Barbara; J. F. Dommerque, telephone engineer, East Orange, N. J.; W. R. Van Bokkelen, chief engineer, Coast Counties Gas & Electric Company, San Francisco; C. F. Benham, engineer O. & M. department, Great Western Power Company, San Francisco; L. C. Williams, O. & M. dept. hydro., Pacific Gas & Electric Company, San Francisco; D. I. Cone, eng. dept., Pacific Telephone & Telegraph Company, San Francisco; C. P. Murray, San Francisco; Robert Sibley, editor Journal of Electricity, San Francisco; R. W. Shoemaker, eng. dept., Great Western Power Company, San Francisco; H. S. Perkins, San Francisco; J. Franklin Stevens, consulting engineer, Philadelphia, Pa.; E. F. Shindel, Winslow, Ariz.; L. M. Klauber, supt. of electric dept., San Diego Consolidated Gas & Electric Company; Chas Notley, Oakland; H. J. Billica, Spokane.

Commander Frederick G. Simpson has returned to civilian life and will again take up his work as vice-president and general manager of the Kilbourne & Clark Manufacturing Company, Seattle, makers of radio apparatus. Early in the war he volunteered and was commissioned lieutenant-commander at the Boston navy yard. Shortly after reaching Boston he was promoted and made district radio material officer with the rank of commander. Later he was placed in charge of all radio material activity on the coast from Connecticut to



Nova Scotia. Prior to entering the service Commander Simpson won renown as the inventor of the radio telegraph system now being manufactured by the Kilbourne & Clark Manufacturing Company. Commander Simpson states that war conditions brought about development in the radio field that will probably equal the progress that could be reasonably anticipated in twenty years of peace.

E. O. Shreve, San Francisco manager of the General Electric Company, has been elected president of the San Francisco Electrical Development League. The prominent part which Mr. Shreve has played in the electrical activities of the West, and his effective work in promoting the welfare of the industry make his election to this responsible position a source of great satisfaction in local electrical circles. The work of the Electrical Development League has been growing steadily in importance ever since its inception and holds

a prominent place among Western activities. The League is to be congratulated on its new president, who has the best wishes of the industry and the whole-hearted support of his co-workers in the work to be accomplished during the coming half-year.

C. B. Campbell of the Rainier Electric Company, Seattle, is making a business trip to Rock Island, Ill.

Gerald B. Rosenblat, electrical engineer of Salt Lake City, Utah, is among recent visitors to San Francisco.

J. T. Huntington, district agent of the Southern California Edison Company, has been transferred from San Pedro to Covina, California.

C. B. Hutchinson, district agent for the Southern California Edison Company at Long Beach, has been appointed district agent at San Pedro.

Frederick G. Cottrell, chief metallurgist with the United States Bureau of Mines, Washington, D. C., is one of San Francisco's recent distinguished visitors.

Robert Sibley, editor of the Journal of Electricity, has been appointed to the Committee on Code of Ethics of the American Society of Mechanical Engineers by President M. E. Cooley.

J. Sandberg, chief engineer of the Stavanger Electric Power Supply of Stavanger, Norway, was an interested visitor at the recent Pacific Coast Convention, A. I. E. E., at Los Angeles.

A. C. Rulofson, one of the founders of the Home Industry League who has recently returned from a six months' trip to Australia, New Zealand, and other points in the antipodes, was the principal speaker at the recent league luncheon.

C. S. Anderson has resigned his position as superintendent of the Clark Electric Power Company of Tooele, Utah, to go with the Western Pennsylvania Power Company. He is now superintendent of the latter company's Butler district.

R. G. Dieck, consulting engineer of Portland and formerly city commissioner in charge of the department of public works, has been appointed secretary to the Industrial Survey Committee which will make a survey of the harbor and industrial facilities.

Leon J. Richardson, Director of the Extension Division of the University of California, has been awarded a medal by the French government in honor of his services during the war, especially the aid given by him to the French educational mission which visited the Pacific Coast last fall.

Professor Vito Volterra of the University of Rome, and one of the most eminent scholars of Italy, will deliver the second series of Hitchcock lectures in the University of California during the period October 6 to 17. His subject will be the Propagation of Electricity and Functional Equations.

F. H. Van Gorder, formerly power apparatus specialist at the New York office of the General Electric Company, has been appointed manager of the Newark Store. Mr. Van

Gorder came with the Western Electric Company in the spring of 1907 as a salesman connected with the company's Chicago house.

John Kelly, who for a number of years was New York district manager of the Edison Storage Battery Company, has been appointed general sales manager of the company, with headquarters at Orange, N. J. Mr. Kelly brings to his new position the experience of a long and varied career in the storage battery, electrical vehicle and accessory business.

C. F. Uhden, hydroelectric engineer of Spokane, has been appointed by City Engineer A. H. Dimock of Seattle to take charge of construction of the Skagit river power plant. This appointment has been confirmed by Mayor Fitzgerald. Mr. Uhden is an engineer of extensive experience in problems involved in such construction and was for years chief engineer of the Washington Water Power Company.

Robert W. Clyde has been added to the sales staff of the H. W. Johns-Manville Company in the San Francisco territory, handling the corporation trade. He was formerly with the Passenger Traffic Department of the Southern Pacific Company. During the war he was first lieutenant in the air service, in charge of motor repair and final assembly at the Aviation Repair Depot, Love Field, Dallas, Texas.

James A. McGraw, president of the McGraw-Hill Company, Inc., and N. A. Bowers, Pacific Coast editor with the McGraw-Hill Company, recently became members of the Board of Directors of the Technical Publishing Company, taking the places of E. B. Strong and R. J. Davis, resigned. W. M. Deming, president and general manager of the company, was elected to fill the office of treasurer in addition.

H. N. Lawrie, for the past seven years chairman of the commission in charge of the Oregon bureau of mines and geology, has been appointed chief of the gold and precious metals division of the American Mining Congress with headquarters at Washington. He has resigned his position on the state commission and is now in Washington. F. A. Olmstead, formerly chemical engineer of the Crown Willamette Paper Company, of Oregon City, succeeds Lawrie as chairman of the state commission of mines and geology.

P. A. Powers, advertising manager for the Benjamin Electric Manufacturing Company, as one of the directors of Chicago's new Engineering Advertising Association has outlined the purpose of the association as follows: "We seek to improve present methods of advertising and selling engineering products by trying to bring the truth to bear upon our problems; by each one laying down his own methods and submitting to friendly criticism; by cooperating in various active efforts, and by the interchange of ideas and experiences."

Ross B. Mateer, formerly in the commercial department of the Great Western Power Company at San Francisco and

later with the Southern Sierras Power Company at Riverside, has since the signing of the Armistice, at which time he held a commission as Captain of Engineers, entered the employ of the Philadelphia Electric Company. At Philadelphia Mr. Mateer has introduced into utility service many new ideas of recreational betterment for the employees of the company and in both local N. E. L. A. and A. I. E. E. sections he has

aided effectively by serving on publicity committees in forwarding these activities. Readers of the Journal of Electricity have followed with interest the articles he has contributed to its columns from time to time on commercial engineering practice.



Meeting Notices for Electrical Men

(The outstanding features of the activities of the past two weeks are the Pacific Coast Convention of the A. I. E. E. and the Convention of the Northwest Electric Light and Power Association at Seattle. The latter will be reported more fully in a subsequent issue. Among other important gatherings are recent meetings of the California Association of Electrical Contractors and Dealers, and of the San Francisco Electrical Development League.—The Editor.)

San Francisco Electrical Development League

At the meeting of September 15th, the San Francisco Electrical Development League held its semi-annual election of officers. E. O. Shreve, local manager of the General Electric Company, was chosen president, the other officers being: first vice-president, James F. Pollard, Sierra & San Francisco Power Company; second vice-president, C. J. Newbery, of F. E. Newbery Electric Company; secretary-treasurer, J. W. Redpath; members of executive committee, Earle Alexander of Alexander & Lavenson Company, and W. B. Sawyer of U. S. Steel Products Company. Arthur Kempston, chief of the Department of Electricity, San Francisco, was selected to fill a vacancy on the executive committee. The new officers were elected by unanimous vote. In taking up his duties as president, Mr. Shreve gave a brief address of appreciation and promised that the League would continue an active force in the community, as it had been under the leadership of Henry Bostwick, retiring president.

S. J. Lisberger, chairman of the committee appointed to confer with the California Industrial Accident Commission, reported that the Commission is planning a revision of the electrical utilization rules, having invited the appointment of an advisory committee of thirty-five members by various organizations throughout the state. It was decided that the electrical industry is not adequately represented upon this proposed committee, and that more members should be allowed it.

Frank D. Fagan, chairman of the day, introduced Edward H. Brown, manager of the California Industries and Land Show who outlined the program of the all-California exhibition to be held in the Civic Auditorium, San Francisco, beginning October 4th. Mr. Brown drew particular attention to Electrical Day—Saturday, October 11th.

C. W. Banta, assistant cashier, Wells Fargo Nevada National Bank, spoke on "A New Common Law in Industry," showing the development of ethical standards among groups of men, and in industrial organizations. He also presented a brief review of the League of Nations from a business man's standpoint. The commercial problems abroad, he declared, now surpass the political problems in importance.

Oregon Association of Electrical Contractors and Dealers

At a meeting of the Oregon Association of Electrical Contractors and Dealers, held on August 18th, the following firms were represented:

Morrison Electric Co.
Jaggar-Sroufe Co.
E. L. Knight & Co.
R. W. Larsen
NePage McKenny Co.

F. A. Bauman & Co.
Smith McCoy Electric Co.
Beaver Electric Co.
Scott Electric Co.

R. C. Kenney reported that together with McCoy and Sroufe a meeting had been held with Electrical Workers Local No. 48 on August 15th and that the Local had voted against submitting the proposition relative to the demand of electricians for increased wages to the Conciliation Board.

At the meeting of August 25th the Labor Committee, R. C. Kenney, chairman, reported that the Electric Workers' Union refused to treat with the committee as a committee of the Contractor-Dealers' Association, therefore the committee was powerless to negotiate with them.

The meeting of Sept. 8th was called to order by W. O. Fouch, acting chairman. A proposal from the Building Trades Council with regard to contracts was discussed, but no action taken.

The secretary was instructed to see the jobbers regarding attendance at the Electrical High Jinks on Sept. 19th.

There being no further business the meeting was adjourned at 9:30 p.m.

Washington Association of Electrical Contractors and Dealers

The Washington Association of Electrical Contractors and Dealers met in Seattle on Sept. 11th for the election of officers, and a business session. The following officers were elected for the ensuing term:

V. S. McKenny, re-elected president; J. J. Agutter, vice-president; W. M. Meacham, vice-president, Seattle District; H. L. Finling, vice-president, Spokane District; A. J. Gladson, vice-president, Yakima District; R. S. Clarke, vice-president, Bellingham District.

California Association of Electrical Contractors and Dealers

A well-attended meeting of the California Association of Electrical Contractors and Dealers was held on Friday evening, September 12th, at the Palace Hotel, San Francisco. M. A. DeLew, president of the association, opened the session by introducing Robert Sibley, editor of the Journal of Electricity, who presented to the delegate of the Modesto section the cup given by the Journal to encourage full attendance at state conventions. C. E. Osborn received the cup for the contractor-dealers of the Modesto district, who won it by their showing at the recent Santa Cruz convention.

C. B. Kenney made a strong plea for cooperation among the different branches of the electrical industry. M. L. Scobey dealt with the dealer's problems, and C. C. Hillis presented the jobber's side of the question. Mr. Hillis pointed out the increased cost of doing business and advised close study of accounts to prevent leakage. D. E. Harris announced that the jobbers are now in a position to put "Wholesale Only" on their doors, but stated that a number of jobbers must attain

BUILDERS OF THE WEST — LXII



JOHN B. FISKEN

In a commercial age it is almost inevitable that all organizations should tend to become more or less permeated with the commercial spirit. It falls to the lot of a few men steadily to maintain the balance of the professional ideal. To John B. Fisk, chief engineer of the Washington Water Power Company, vice-president of the American Institute of Electrical Engineers and chairman of the Pacific Coast convention of the Institute just passed, this issue of the Journal of Electricity is affectionately dedicated, in recognition of his untiring work for the upbuilding of the Engineering Society in its truest form, and of his devotion to the best ideals of the engineering profession.

satisfactory distribution of certain lines before they are justified in completely adopting this policy.

Captain Howard Angus, secretary of the California Electrical Cooperative Campaign, outlined the work being undertaken at present, especially in regard to the organization of the Salesmen's Auxiliary. Arthur Rowe interpreted the manufacturer's viewpoint on current merchandising problems; and A. H. Halloran, of the Journal of Electricity, talked on the necessity of service-publicity.

Clyde L. Chamblin, president of the association for the coming year, directed attention to the fact that the increased cost of overhead is likely to cross the line of decreased profits unless adjustment is made. Ralph W. Shearer, of Reno, Nevada, spoke a few words in behalf of the Nevada association, of which he is secretary; and F. D. Fagan made an announcement for the California Industries and Land Show in the Civic Auditorium, October 4th to 19th.

Brewster Hall, of Pass & Seymour, congratulated the contractor-dealers of the Pacific Coast on their progressiveness and their successful business methods. H. H. Court-right, of Fresno, predicted an unprecedented sale of electrical washing machines and vacuum cleaners during the next six months. C. F. Butte touched on the subject of jobbers handling industrial orders, contending that this is a proper province of the contractor-dealer. After Frank P. Somers had delivered his cheerful business message from the Santa Clara Valley, the meeting adjourned.

About 125 attended the gathering.

Electric Cooperative League of Los Angeles

At a recent meeting of the officers of the Los Angeles Jovian Electric League, it was decided to change the name of the organization to the Electric Cooperative League of Los Angeles. Plans were laid for four series of ten meetings each during the coming year. At each of these meetings a fifteen-minute talk on some electrical subject of vital interest to the entire electrical industry will be given in addition to the main speaker of the day. Some of the subjects that will be presented before the League in the first series are:

Modern Merchandising, by G. E. Arbogast.
The Work of the Salesmen's Auxiliary, by D. C. Pence.
The Relationship between the Central Station and the Electrical Industry, by A. W. Childs.

The first meeting will be held October first at which time tickets will be sold for the entire ten meetings of the first session. The ticket sale is to be handled by A. E. Morphy, chairman of the membership committee. The series tickets will include the cost of the luncheon for ten meetings.

The following officers, board of directors, and committee chairmen have been elected for the coming year:

President—Ralph B. Clapp, manufacturers' agent.
First vice-president—A. W. Childs, superintendent of sales, Southern California Edison company.
Second vice-president—G. E. Arbogast, vice-president and general manager, F. E. Newbery Electric Company.
Secretary-Treasurer—Carl M. Heintz, promotion representative, Westinghouse Electric & Manufacturing Company.
Chairman Finance Committee—H. L. Harper, Los Angeles manager, Western Electric Company.
Chairman Membership Committee—A. E. Morphy, secretary Southern California Edison Company.
Chairman Program Committee—R. J. McHugh, district manager, Garnett Young & Company.
Chairman Attendance Committee—C. D. La Moree, manager supply division, Westinghouse Electric & Manufacturing Company.
Chairman Holding Committee—J. G. Pomeroy, manufacturers' agent.
Chairman Reception Committee—H. N. Sessions, commercial engineer, Southern California Edison Company.
Board of Directors—E. L. Lewis, superintendent Los Angeles Railway Corp.; J. O. Case, local manager supply department, General Electric Company; A. E. Peat, treasurer and comptroller, San Joaquin Light & Power Corporation; N. W. Graham, Graham-Reynolds Electric Co.; E. R. Northmore, Los Angeles Gas & Electric Corporation; James Colkitt, John A. Roebling's Sons Company.

Pacific Northwest Engineering Society

Fifty representative engineers of Seattle, Tacoma, Everett and other surrounding cities met and made application to the national board of directors for a local chapter of the American Society of Engineers, covering the state of Washington and Alaska, to be known as the Pacific Northwest

Society of the American Association of Engineers. The national headquarters is in Chicago with Prof. F. H. Newell as president.

Temporary officers elected were: S. D. Clinton, cost data engineer, Vulcan Iron Works, president, and J. A. Hopkins, engineer, Seattle Boiler Works, secretary. The following directors were appointed from the membership:

American Chemical Society, A. G. Bissel and Charles A. Newhall; American Institute of Electrical Engineers, A. A. Miller and S. C. Lindsay; American Institute of Mechanical Engineers, Henry Beacher and R. M. Dyer; American Institute of Mining Engineers, A. Slater; American Society of Civil Engineers, J. L. Hall and C. D. Clinton; railway engineering employees, R. H. Jones and F. J. Engle; state engineering employees, Clarence Dohm and J. A. Davis; county engineering employees, Carl Morford and F. G. White; city engineering employees, T. H. Carver and Eben French Chase; educational institutions, Dr. H. K. Benson and C. C. Moore; Pacific Northwest Society of Engineers, J. A. Jackson and D. W. McMorris; Engineers' Club, E. B. Hussey and Frank E. Fowler; at large, J. C. Ralston and Peter Tegtmeyer.

Professor Newell has just finished a tour of the states, organizing all civil, mechanical, electrical, mining, and in fact all engineers under one head.

The object of the association is to raise the standard of the ethics of the engineering profession, to influence proposed legislation affecting the engineering profession and to take action necessary to safeguard the profession and to promulgate the association's ideas through proper publicity.

Northwest Electric Light and Power Association

As these forms go to press the convention of the Northwest Electric Light and Power Association at Seattle is still in progress. Among those who are representing California at the gathering are the following: S. M. Kennedy, general agent Southern California Edison Company; B. M. Maddox, manager Mt. Whitney Power & Light Company; A. E. Wishon, assistant general manager San Joaquin Light & Power Corporation; W. S. Berry, sales manager Western Electric Company, San Francisco; D. E. Harris, vice-president and sales manager Pacific States Electric Company; H. R. Noack, Pacific States Electric Company; E. B. Criddle, Southern Sierras Power Company; Robert Sibley, editor Journal of Electricity; J. E. Crilley, Standard Underground Cable Company; Nathan A. Bowers, McGraw-Hill Company.

Electrical Contractors and Dealers' Association of San Francisco

Cooperation with the organization of Oakland electrical contractors, for mutual protection and support, was favorably considered at the regular meeting of the Electrical Contractors and Dealers' Association of San Francisco, on September 19th. Amendments to the by-laws of the association were proposed, providing for non-resident membership for contractors of the East Bay district doing business in San Francisco. Similar privileges for San Francisco contractors are contemplated in the Oakland body.

Joseph M. Carlson, of the Central Electric Company, a member of the conference committee, reported the decisions of a recent meeting under the auspices of the Building Trades Council, at which the committee was represented, adjusting differences of opinion on rules of procedure between architects and general contractors.

Oregon Chapter, American Association of Engineers

W. H. Marsh was elected president of the newly-organized Oregon chapter of the American Association of Engineers at a meeting in the association club rooms in the Tilford building. Other officials named: First vice-president, O. Lauregard; second vice-president, B. C. Ball; third vice-president, E. G. Hopson; secretary, R. W. Barnes; treasurer, W. C. Ruegnitz. Committee chairmen who are members of the executive board were elected as follows: Publicity, Orrin E. Stanley; entertainment and program, J. C. Stevens; constitution and by-laws, A. H. McKeen; legislative, R. A. Klein; club rooms, J. W. Cunningham; budget, L. T. Merwin; engineers' welfare, C. F. Thomas.

Illuminating Engineering Society

The annual convention of the Illuminating Engineering Society, which will take place in Chicago, October 20th to 23rd, promises a program of exceptional interest.

It is hoped that there will be a good representation from the West, and that those going East at that time will make it a point to stop off in Chicago, if only for one day.

Pacific Coast Gas Association

The Pacific Coast Gas Association at the closing session of its recent annual convention in Los Angeles, elected the following officers: President, A. B. Day, general manager, Los Angeles Gas & Electric Company; vice-president, L. B. Jones, assistant chief engineer, gas department, Pacific Gas & Electric Company, San Francisco; secretary-treasurer, Henry Bostwick, manager San Francisco district, Pacific Gas & Electric Company.

The following were elected directors: John A. Britton, vice-president and general manager, Pacific Gas & Electric Company, San Francisco; W. B. Cline, Los Angeles; C. B. Babcock, San Francisco; W. M. Kapus, Portland; D. J. Young, Tacoma; Frank A. Leach, Jr., Oakland.

Westinghouse Meeting

The San Francisco offices of the Westinghouse Electric & Manufacturing Company were hosts to a number of meter men from the various district offices of the Pacific Gas & Electric Company on Sept. 22 and 23. A dinner at the Engineers' Club on Sept. 22 was followed by a lantern slide lecture of watt-hour meters by J. E. Bridges. Demand meters were the subject of another lecture on the following day.

The Synchronous Club

The Synchronous Club of Los Angeles held a meeting on Tuesday, September 9th, at the Edison Company office building. N. E. Brown, of the U. S. Electrical Manufacturing Company, spoke on "The How and Why of Electric Motor Manufacture."

Society of Motion Picture Engineers

The fourth annual convention of the Society of Motion Picture Engineers will be held in Pittsburgh, Pa., October 13, 14 and 15. H. M. Wible is chairman of arrangements.

PACIFIC COAST CONVENTION, A. I. E. E.

BY D. I. CONE

The proposal to establish the 220-kv. transmission "buss-bar," to interconnect the great prospective water power developments of California and the load centers, was chief among many subjects of deep interest to electrical engineers that occupied the sessions of the eighth Pacific Coast Convention of the American Institute of Electrical Engineers held at Los Angeles, September 18, 19, 20. This paper, by R. W. Sorenson, H. H. Cox and G. E. Armstrong, was printed in full in the *Journal of Electricity*, September 1.

The meeting was noteworthy for the value of the papers presented, the thorough discussion, and for the splendid hospitality shown by the Los Angeles section as hosts. The convention meetings were held at the Hotel Alexandria and were presided over by Vice-President John B. Fisk, chief engineer of the Washington Water Power Company, in the absence of President Townley.

A method of determining the order and amplitude of harmonics in voltage wave-forms by indicating instruments was presented by Prof. Leslie F. Curtis of the University of Washington. It is based on the wave-meter of radio telegraphy, modified to apply to power system frequencies and to make allowance for the fundamental frequency.

L. M. Klauber, of the San Diego Consolidated Gas & Electric Company, presented a method, based on the mathematical theory of probabilities, for determining the most economical number of suspension insulator units for a transmission line.

A discussion sent by Capt. W. D. A. Peaslee emphasized the need of improved insulator design.

Prof. Hubert V. Carpenter's paper on the predetermination of synchronous phase-modifier performance was presented, in his absence, by Prof. Wilson of the University of Southern California, who pointed out the application of the well-known Perrine-Baum diagram to the calculation of transmission line performance.

A report on the progress of the Committee on Railway Electrification of the San Francisco section was presented by P. M. Downing, describing its organization and program and emphasizing the challenge to action on account of the present enormous use of fuel oil and the threat of depletion of the supply.

The splendid series of brief papers on "Operating Difficulties," two of which appeared in the *Journal of Electricity*, Sept. 1, 1919, attracted much discussion and proved a most successful feature.

Various expeditions and special meetings were a feature of the convention:

On Sept. 18, a very enjoyable luncheon was held with the Joint Technical Societies of Los Angeles.

On Friday, Sept. 19, following the afternoon technical session, visits were made to the Torrance automatic substation; the main city substation of the municipal Bureau of Power and Light, and to the Eagle Rock substation of the Edison Company.

Following a technical session Saturday morning, the members were conducted in automobiles to Mt. Whitney Observatory. Prof. Anderson gave an address dealing with electrical and power supply questions presented by the study of the sun. Opportunity was given to inspect the astronomical equipment of the observatory.

Great credit is due to the Los Angeles section, under the direction of C. A. Copeland, chairman, and the Convention Committee for their splendid work.

It was voted to hold a convention in 1920, arrangements of time and place being referred to Vice-President Fisk.

IN MEMORIAM

Hermann Frederick August Schussler, M.A.S.C.E.

Died April 27, 1919

Hermann F. A. Schussler came to California from Europe in 1864 after having spent two years in the study of hydraulic and mechanical engineering at the Zurich and Karlsruhe polytechnic schools. In October, 1864, he entered the service of the Spring Valley Water Works (now Spring Valley Water Company), which supplies water to San Francisco, being advanced to the Chief Engineership in 1866, and serving in that capacity until 1908, after which he gave his time to his private practice as consulting engineer.

During his 42 years of active charge as Chief Engineer of the Spring Valley Water Company, Mr. Schussler designed and constructed all the works of the Water Company, whose aggregate cost during that time reached \$20,000,000 and which include such well-known achievements as the Crystal Springs Dam.

Among other things, Mr. Schussler was the first engineer to make use of the thin wall dam.

The last notable structure carried to achievement under his direction is the dam across the Klamath River, California, erected for the California-Oregon Power Company and generally referred to as the "Copco" dam.

In recognition of Mr. Schussler's work as an engineer, the American Society of Civil Engineers appointed a committee to prepare a testimonial. This tribute, summarizing Mr. Schussler's activities in the engineering field, has recently been approved by the members of the society.

Self-Interest in Electrical Development

BY A. E. WISHON

(That no human activity is isolated, and that progress and development in one field have a vital influence on the prosperity of the whole community is the keynote of this message to the West from the assistant general manager of the San Joaquin Light and Power Corporation. It formed part of an address delivered by Mr. Wishon before the San Francisco Electrical Development League on September 22.—The Editor.)

That the accomplishments of the Pacific Coast Section of the National Electric Light Association are receiving national recognition, is evidenced by the fact that today Mr. R. H. Ballard, first president of the Pacific Coast Section, has earned the presidency of the National Electric Light Association, and Mr. John A. Britton, dean of the industry of the West, is chairman of the Public Policy Committee of the national body—controlling the affairs of electrical policy throughout the nation.

During this Western administration of the national organization, an effort is being made to develop the geographic section idea, looking ultimately to the time when the country will be divided into geographic sections, to handle problems of local interest—national problems to be handled through delegates from these sections who will meet once a year in national convention.

The National Electric Light Association Convention is to be held in California next year. It was hoped by many that there would be a joint convention of the National Electric Light Association and the Pacific Coast Section, but this is not to be. It is the thought that the National Electric Light Association will consider strictly national problems, while the Pacific Coast Section will handle problems of local interest as in the past, thus bringing out clearly the necessity for the geographic section, also for the national body to act as a clearing-house for national problems in national convention. The Pacific Coast Section of the National Electric Light Association convention will be held prior to the national convention; it will be no preliminary, but a main event of a different date.

Briefly, as to the plans of the Pacific Coast Section for this year. The organization set up is as follows: John A. Britton is to act as chairman of the Public Policy Committee, Paul M. Downing chairman of the Engineering Committee, K. E. Van Kuran chairman of the Commercial Committee, I. W. Alexander chairman of the Publicity Committee, Tracy Bibbins chairman of the Committee on Cooperation, P. R. Ferguson chairman of the Accounting Committee, and H. N. Sessions chairman of the Membership Committee. In appointing the chairmen of these committees it was definitely understood that the job carried no salary and no particular honor, but very much hard work and responsibility; and when those committee chairmen in turn selected their committee members, that same message was sent out. All committee chairmen are to be present at all executive meetings. What we want is a close working understanding, so that there will be no duplication of effort and no working at cross-purposes.

It was decided at the last executive meeting that as far as possible all convention sessions would be joint sessions, giving the commercial man a chance to hear the engineering problem and the engineer a chance to hear the commercial problem. Furthermore, it was a decision of that same meeting that a subject under discussion be handled from different angles. For instance, the subject of the electrification of railways has the engineering angle, the commercial angle and the public policy angle.

It was further agreed that the different papers brought out through the year should be published through technical magazines, so that there would be plenty of time for study and discussion prior to the convention. These are a few of the plans of this year's work by the Pacific Coast Section.

The greatest problem that faces us today is that of having the public understand what the electrical industry is doing for the nation, but in our opinion this understanding can only be brought about by proving to the individual of this public what the electrical industry is doing for him—what further developments of the electrical industry mean to him in dollars and cents gain, and what a delay in electrical development, due to legislative or other causes, means in dollars and cents loss to his individual business.

We who have studied the problems of the development of the West, know that the West will not develop ahead of its hydroelectric development. The greater portion of the Western territory depends upon hydroelectric pumping for irrigation of its arid lands, if agriculture is to be further extended. If factories are to be located West, cheap power must be obtainable. Any form of legislation, national or state, that delays electrical development, delays the development and prosperity of the West, and any thinking electrical man can sit down and figure out just where any particular business loses in dollars and cents when hydroelectric development ceases. Prove your case to the individual by proving where that individual's pocketbook is hurt, when your own business is hurt, and you will have a convert who will see that your business is allowed to prosper. When electrical development ceases, the prosperity of the contractor, dealer, jobber and manufacturer ceases. When electrical development is encouraged, your business prospers.

This Western country is yet unsaturated electrically and will be for many years to come, and the engineers and commercial men of the different companies have, based upon past experiences, plotted their anticipated load curves several years into the future.

Superimposing these anticipated load curves, we have before us a graphic proof of just what increase in kilowatts we can expect for this territory for the future, if proper encouragement is given to electrical development.

Next, dividing our total electrical investment of today by the total kilowatt load, giving us the unit cost per kilowatt of investment. Taking the cost per kilowatt installed, it is a simple matter to multiply the increased load of any future year by this unit cost and determine the moneys to be spent in electrical development in the West in any future year.

Next, with our standard classification of accounting, as set up by the Railroad Commission, it is a simple matter of mathematics to determine the amount to be invested in generators, dams, transformers, copper, etc., that, under normal conditions, the Pacific Coast will require during any period in the future.

This data is all available. It is a simple matter of putting it together in a graphic plan that will prove to the different interests and to the individual, what electrical development means to him in dollars and cents.

After it has been proved to you what the electrical development of the Pacific Coast means to your individual interests, you will probably begin to use the same proof to others, knowing that hydroelectric development benefits you in dollars and cents; for instance, you will call the attention of your eastern manufacturer to this graphic proof, by showing him just how much his sales increase if electrical development is encouraged and we are allowed to continue under normal conditions, and just how much he will lose in dollars

and cents if hydroelectric development in the West is hampered. He in turn will get the idea and will call the same to the attention of the steel mills, the copper mills and the different manufacturing concerns that sell him the products used in the manufacture of electrical equipment.

There are a thousand and one angles and possibilities to graphic presentation and proof. For instance, I have only called attention to a few points affected by moneys directly spent in electrical development, and have neglected to call attention to the increased payrolls in manufacturing centers, jobbing houses and on construction jobs, made possible by electrical development, and that can be definitely and graphically proven in dollars and cents.

To cover just another angle of the situation, let us leave the direct benefits of construction moneys expended and turn to the effect of those kilowatts of increased load when put into operation. We have our segregated classes of consumers for the past, and if 100,000 kilowatts are to be added in this state for 1921, it is a simple matter to determine approximately what increase would occur in the different classes of consumers—as to how many farms would start, how many factories would start and how many new homes would be connected.

This added business means material sales for the general merchandise interests throughout the state; means added payrolls for the different trades during constructions; means continued production, continued factory payrolls and continual sales to the new population that come into our territory to carry on the operation of the different lines of business started through this hydroelectric development.

In the San Joaquin territory, I can show by my segregated classes of business that under proper encouragement

500 agricultural consumers will be connected in 1920 and that of these consumers, 400 are beginners requiring barns, buildings, fences and general building materials; and if I can show, on this same curve, that during that same period 1500 new homes in town are to be built, do you think I can interest the lumber interests and can prove to them just what their lumber sales would be, based upon this increase? This has already been tried as an experiment, and the lumber man is very much interested.

Another extreme experiment that was tried was proving to an overall manufacturer what it meant to him in the sale of overalls. He is a convert and is today interested in encouraging electric development. Why? Because it means that his sales in overalls will increase in a definite amount of dollars and cents.

This subject of graphic presentation to the individual has been discussed by the engineers, statisticians, commercial men, publicity men and others interested in this year's work of the Pacific Coast Section. We believe that it offers a solution of putting over that story, which we all know to be true, so that it will appeal to and be understood by the individual, and as the mass of individuals constitute the public, it will then be understood by the public—and, our development will be encouraged—not discouraged—by the individual and by this public, because it is of benefit to the individual and to the public.

The public will understand that to delay electrical development on the Pacific Coast delays local and national development in all lines of business; in that financing is necessary to electrical development; in that fair legislation is necessary to finances, and that that is all we are asking for.

HAPPENINGS IN THE INDUSTRY

LECTURES ON HEATING ENGINEERING

By request of Portland Local Union No. 87 of the International Union of Steam and Operating Engineers, a course in heat engineering will be offered in Portland under the direction of O. B. Goldman, professor of heat engineering at the Oregon Agricultural College. A series of eleven lectures will be given, starting October 18, several of which will be delivered by Professor T. A. H. Teeter. The course is being arranged by a committee consisting of Ray Depperman, chief United States Fleet Corporation; A. F. Towner, chief engineer of the Meier & Frank building, and George W. Stitt, engineer and secretary of the local union.

INTERNATIONAL TRADE CONFERENCE

The program of the International Trade Conference being held at Atlantic City September 30 to October 3, by invitation of the Chamber of Commerce of the United States, includes among its topics for consideration, the economic readjustment of commercial and industrial conditions in England, France, Italy and Belgium. This is with a view to arriving at an estimate of the requirements of food, raw material and manufactured articles, to serve as a guide to American business men, manufacturers, producers, bankers, etc., in planning their trade relations in the future.

Finance is another of the general subjects, including foreign exchange and all the forms in which questions of credits may arise.

It is recognized that wars have been due to trade rivalry, and the commercial hostility which leads to armed conflict may probably be a cumulative effect of innumerable irritations of unfairness and discrimination, having an influence in official circles which are in communication and sympathy with

the commercial class. These practices are all manifestations of a spirit of hostility which might possibly be lessened by discussion, and a general consideration of unfair competition in foreign trade to see how far the principles of fairness, which have been applied in legislative and administrative regulation to domestic trade, might be applied to international trade.

Fair play in international commercial competition was promoted before the war by international congresses of chambers of congress. It will be promoted likewise by the meeting at Atlantic City, and the event should result in arrangements for future study and solution of international problems in the commercial field.

There is an American committee for every subject, including producers, shippers and economists, meeting from day to day with the foreign delegates. By this method of procedure every foreign delegation will have opportunity to state the needs of his country to the appropriate committee.

The chairman of the delegation from Italy is Guglielmo Marconi, father of the wireless telegraph.

WIRELESS SERVICE BETWEEN PARAGUAY AND ARGENTINA

An agreement has been signed by the Argentine and Paraguayan governments for the establishment of a wireless telegraph service between the two countries. The installations had already been made, but the initiation of the service has been delayed by the failure of the Argentine government to ratify the convention. While the Paraguayan government approved the convention on November 22 of last year, it was not signed by the proper Argentine authorities until recently. The same rates are to be in force as prevail in the regular telegraph service.

IRRIGATION IN MONTANA

The subject of irrigation is receiving more and more attention in Montana. Recently an investigation trip was made in the Flathead Valley district by business men, farmers and others interested in increased crop yields, under the auspices of the Kalispell Farm Bureau. A number of farms which are irrigated by means of electric power furnished by the Mountain States Power Company were visited. W. B. McDonald, manager of the Kalispell division of the company, accompanied the party and explained the advantages of electric power pumping. It was shown that at an expense of approximately \$14.00 per acre (depending on the size of the farm) an electric irrigating system could be installed which would insure an abundant supply of water at all times. It was further shown that the increased crops as a result of the irrigation more than pay for the installation in a single year. In one instance two crops of alfalfa brought the owner \$100 per acre.

FOR ELECTRICAL ENGINEERS

The United States Civil Service Commission announces an open competitive examination for junior electrical engineers, for men only. Vacancies in the Bureau of Mines, Department of the Interior, for duty at Pittsburgh, Pa., or elsewhere, at \$1,080 to \$1,200 a year, with temporary increase of \$240 a year granted by Congress, if services are satisfactory, and in positions requiring similar qualifications, at these or higher or lower salaries, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the relative weights indicated:

Subjects	Weights.
1. Physical ability	10
2. Education and experience.....	90
Total.....	100

Graduation from a four years' course in electrical engineering in a college or university of recognized standing, and at least one year's experience in electrical engineering work outside the college, are prerequisites for consideration for this position.

EMPLOYEES PRESENT TESTIMONIAL

Following upon a gift of \$100 to every man and woman who had been in the employ of The Holtzer-Cabot Electric Company for ten years or more, a testimonial was presented to the president. It contains an expression of thanks for the generous recognition, and for the good feeling that has always existed between the officials of the company and its employees.

ACCIDENT PREVENTION

A. F. Duffy, manager of the Safety Section, Division of Operation, United States Railroad Administration, has decided to hold the National Railroad Accident Prevention Drive for a period of two weeks, beginning October 18 and ending October 31, along the general lines of the recent successful sectional campaigns of like character.

Intensified safety work on American railroads has attracted the attention of British and Japanese railroad officials who have written to the United States Railroad Administration for information on the subject.

PUEBLO PLACED ON AIR ROUTE

Pueblo, Colo., which is served electrically by the Arkansas Valley Railway Light & Power Company, has been placed on the first mid-western aerial passenger, express and mail route which is to operate between Fort Worth, Texas, and Denver, Colo. The airships will accommodate several passengers and will make the complete trip every day, an airship leaving each city every morning. The trip between cities will be made in twelve hours, or one-third of the time required by trains.

HIGHER PAY FOR ENGINEERS

The American Association of Engineers has taken up the problem of increasing the pay of engineers. The first branch to receive attention was the railroad engineers and the results were more than they even expected, members reported.

The following schedule of salaries has been adopted by the association:

- City engineer, annual work, \$5000 to \$15,000.
- City engineer, annual work, \$2500 to \$10,000.
- City engineer, annual work, \$1000 to \$7500.
- City engineer, annual work, \$500 to \$5000.
- Department engineer, \$7500.
- Division engineer, \$7500.
- Assistant engineer, \$3600.
- Instrument man (preferably technical graduate), \$2400.
- Rodman (high school, 2nd grade), \$1500.
- Inspector, \$1800.
- Architect, \$5000.
- Designing engineer (technical graduate, 10 years' experience), \$6000.
- Designer (technical graduate, 5 years experience), \$4400.
- Detailer (technical graduate preferably), \$3000.
- Tracer (technical high school), \$1800.
- Draftsman, architectural, \$3000.
- Draftsman, map or topographic, \$2400.
- Draftsman, structural, \$2400.

Among other things, the association is vigorously supporting the plan for a national department of public works.

VOCATIONAL CLASSES FOR EMPLOYEES

Vocational classes were opened in September for employees at the Alameda plant of the Bethlehem Shipbuilding Corporation, under the auspices of the Board of Education. The courses include draughting, machine-shop practice, electric welding, riveting and general electrical work. The Corporation provides free quarters and equipment, the remainder of the expenses being met from federal, state, and city funds.

NEW LABORATORIES OF THE BUREAU OF MINES

The new million-dollar laboratories of the Bureau of Mines, Department of the Interior, in Pittsburgh, Pa., just dedicated, are equipped for the highest grade of research and routine work. Typical coals, gathered from all parts of the country, are analyzed and tabulated in such a manner as to give to the public general information of the coal fields of the country; actual experiments in the combustion of coal take place under experts and their findings are given publication.

There is a complete electrical laboratory where electric mining equipment is tested under schedules issued by the Bureau from time to time as the need of a particular class of apparatus develops. The types of apparatus for which schedules have been issued to date, include the following: Permissible portable electric lamps, permissible electric motors for mines, permissible miner's safety lamps, permissible gas detectors for mines, permissible mine locomotive headlights, permissible electric lamps for mine-rescue service, and permissible flash lamps that are safe for use in explosive mixtures of methane and air.

AUSTRALIAN ELECTRIC POWER PLANT TO BE ENLARGED

The Municipal Tramways Trust of Adelaide, South Australia, an organization which is incorporated and under the control of the municipalities comprising the metropolitan area of Adelaide and which owns and operates the electric street railway system, will shortly ask for bids for the installation of a new 10,000-horsepower electrical unit for its plant. A movement has been started to have the charter of the trust enlarged so as to allow it to furnish electrical power in competition with the Adelaide Electrical Supply Co. (Ltd.), a private corporation which furnishes Adelaide with light and power.

American manufacturers of electrical machinery and equipment should address their inquiries to the General Manager, Municipal Tramways Trust, Adelaide, South Australia.

ILLUMINATION PLANS

The illumination at the California Industries and Land Show, scheduled for October 4th to 19th this year, will be one of the most ambitious undertakings along this line seen in this state. Eighty thousand incandescent lights will burn, the bulbs ranging all the way from tiny fairy lights to large size globes of every conceivable shape and shade.

There will be thousands of feet of electric wiring for the illumination of the various exhibits, with a great spectacular display by one of the electrical companies for the center.

Among other awards there are to be medals for the best exhibits of electrical appliances—a gold medal for the first, a silver medal for the second and a bronze medal for the third. These displays will be divided into electrical cooking appliances, incandescent lamps, etc.; dynamos and motors; heating and other appliances, including flat irons and curlers; electrically operated washing machines; electric dry batteries and storage batteries.

SALES CONFERENCE IN IDAHO

Ideal weather conditions and a large and enthusiastic attendance marked the semi-annual Sales Conference of the Montana Electric Company and the Washington Electric Supply Company, held at Hayden Lake, Idaho, September 15th to 19th, 1919.

Those in attendance as representatives of the associated companies were:

E. W. Anderson, Boise.
E. K. Bacon, Billings.
M. I. Blakemore, Great Falls.
J. Duhan and A. J. Stanbury, Butte.
Millard Sebern, C. M. Wright, H. T. Whitehouse, A. H. Crowell,
W. E. Brebner, and J. J. Mullins, Spokane.
H. W. Turner, president.
H. L. Bargon, general manager.
L. F. Philo, general sales manager.

Mr. Philo presided.

Manufacturers in attendance were:

Benjamin Electric Mfg. Co., C. A. Martin.
Bryant Electric Co., W. O. Dahlstrom.
Gould Storage Battery Co., H. A. Borup.
Baker-Joslyn Company, H. H. Manny.
Kellogg Switchboard & Supply Co., F. H. Russell.
H. W. Johns-Manville Co., Geo. A. Saylor, J. H. Roe, Franklin
Shuey, G. A. Gregory, W. H. Hoge.
Crouse-Hinds Company, A. E. Vieau, F. H. Gerhart.
Landers, Frary & Clark, Paul W. Quick.
Edison Electric Appliance Co., R. W. Turnbull.
Hurley Machine Company, R. G. Chamberlain.
Geo. Cutter Co., L. A. S. Wood.
Free Sewing Machine Co., C. W. Darby.
Arthur & Fowler Company, Guy Arthur.
Manhattan Electric Supply Co., E. M. Haig.
Westinghouse Electric & Manufacturing Co., B. S. Manuel, C. V.
Aspinwall, E. V. Peterson, R. J. Cobban, S. E. Dunn.
Westinghouse Lamp Co., H. D. Howell, R. F. Donaghue, F. R.
Hamill.

Awards were made as follows: Champion fisherman (oral), E. K. Bacon; (actual), A. H. Crowell. Winner of golf tournament, Turner Cup, L. F. Philo; runner-up, C. V. Aspinwall.

LUNCH CLUB FOR EMPLOYEES

A modern cafeteria and restaurant, seating over three thousand persons and providing well prepared food on a "service at cost" basis, is the latest plan of the Westinghouse Electric & Manufacturing Company in East Pittsburgh.

The first and second floors, seating 2500 people, will be devoted solely to "help yourself" cafeteria service, while the third floor will have a modern table service restaurant, as well as the kitchens and an auditorium seating over 1000 which will be used for meetings of the various organizations.

Only the most modern conveniences of culinary art will be employed. The cafeteria counters will have moving belts to carry the trays of food placed on them, allowing the passing diner to have his hands free to select food. A huge refrigerating plant on the first floor will not only cool all foodstuffs in the refrigerators, but will also provide cold drinking water at the numerous fountains scattered through the cafeterias as well as manufacture ice.

TRADE NOTES

Business Changes Hands —

The Electric Agencies Company, manufacturers' representatives at San Francisco, Los Angeles and Seattle, have been succeeded by the Allied Industries, Inc., with headquarters at 283 Minna street, San Francisco.

New Branch Office —

The Western Electric Company has recently opened a new branch, consisting of a sales office and warehouse, at 334 East Bay street, Jacksonville, Florida. This distributing house has been established for the purpose of enabling the company to give improved service to its customers in the extreme southeastern part of the United States. The house is in charge of Mr. A. H. Ashford.

A full line of electrical supplies and specialties will be carried at this house. This will include pole line hardware, cross arms and other pole line construction material; all inside wiring material; portable sewing machines, vacuum sweepers, washing machines, heating apparatus and all other electrical household appliances.

Agent Appointed —

The Ward Leonard Electric Company of Mount Vernon, N. Y., manufacturers of Ward Leonard Vitrohm resistance units, theater dimmers and electric controlling devices, have appointed Lyman C. Reed, 821 Union street, New Orleans, La., as their selling agent in that territory.

Furnace Order —

After an extensive investigation of the various types of electric furnaces and a visit to the U. S. Navy Yard at Puget Sound, where a six-ton Greaves-Etchell furnace is in operation, the Vancouver Engineering Works, Ltd., Vancouver, B. C., has given an order to the Electric Furnace Construction Company for a Greaves-Etchells furnace.

One of the events of the A. I. E. E. Convention at Los Angeles—the dinner given to the wives and daughters of members on Friday evening, September 19th, at the Hotel Alexandria.

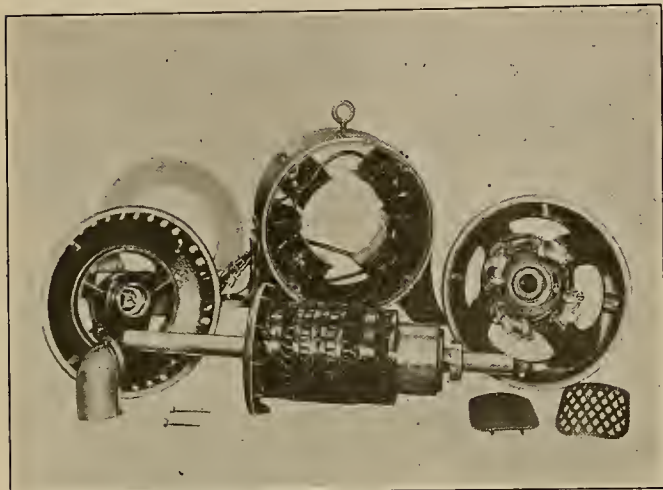


LATEST IN EVERYTHING ELECTRICAL

(A recently-introduced line of direct current motors appears among the industrial items of interest here presented, together with something new in condensers, and a convenient and adaptable indicator. The new power plant at the Georgia School of Technology is a recent interesting installation reported by the Westinghouse Company.—The Editor.)

NEW LINE OF DIRECT CURRENT MOTORS

In the new line of commutating pole direct current motors and generators which has just been introduced by the Allis-Chalmers Manufacturing Company, the machines are not only rugged and compact, with excellent operating char-



Type "E" motor dismantled, 25-hp., 230-volt, 1150-r.p.m. All type "E" motors are of the commutating pole type.

acteristics, but the many details which contribute to accessibility, reliability and safety have been thoroughly worked out. This line includes the following standard ratings:

- 1 Continuous rated (50°C. rise) motors, for applications where the power requirements are definitely known.
- 2 Normal rated (40°C. rise) general purpose motors.
- 3 Adjustable speed motors for continuous or intermittent service.
- 4 Generators and exciters.

For constant speed motors the ratings and speeds are the same as those of 60-cycle induction motors, and they can thus be used interchangeably with induction motors for direct connected applications without changing the method of drive or the ratio of gearing.

Adjustable speed motors, intended particularly for machine tool and similar applications, are provided for 2:1, 3:1 or 4:1 speed range. Generator speeds also correspond to those of induction motors, thus permitting the direct coupling of the machines to form motor-generator sets in various combinations.

The line of ratings now complete covers motors from $\frac{1}{2}$ to 40-kw., while larger sizes are under development.

Cast steel yokes, combining light weight and rigid construction, are used for the larger ratings while the smaller machines, which are of the bi-polar type, have riveted frames.

All machines have ring oiling, dust proof bearings, while the windings are treated to resist oil and moisture. Conduit terminal boxes, regularly supplied, have removable covers, giving ready access to the terminals.

Box type brush holders are adjustable for tension and suitable for either direction of rotation. Each holder can be removed independently with a screw driver or wrench. At least two brushes per stud are used.

The field coils are wound on metal spools, which prevent any movement of the coils, and are protected by an outside layer of enameled wire.

The armature core has the laminations riveted together, permitting the removal of the shaft without dismantling the core or commutator, while for ratings of 20-hp., 850-r.p.m. and larger, the core and commutator are built on a sleeve, so that the shaft can be pressed out of the finished armature without disturbing the windings.

An important feature of the machines is the very thorough ventilating system which has been provided. The air being drawn out by the fan mounted on the rear armature head, fresh cool air flows in through the liberal ventilating ducts and takes up the heat from the iron and windings. This heated air is forced out through openings in the periphery of the rear bearing bracket. With thorough ventilation the internal temperatures are kept low, thus greatly prolonging the life of the insulation.

This new line, which is designated as the Allis-Chalmers Type "E," is completely new throughout, no attempt having been made to re-design old apparatus or to employ parts from any previous machines. The motors are designed for belted as well as direct connected applications and are particularly suited to the exacting requirements of machine tool service.

NEW DEVELOPMENTS IN CONDENSERS

A new and valuable development in steam surface condensers is announced by the Wheeler Condenser & Engineering Company, Carteret, N. J. It is a patented "compartment condenser" that can be cleaned while in service without shut-

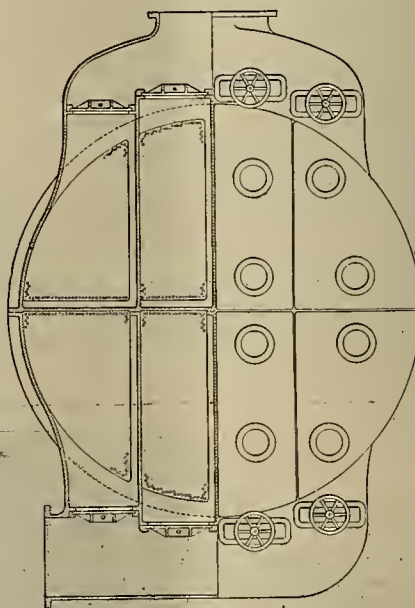


Diagram of condenser, showing the arrangement of the compartments. Each compartment is equipped with a set of valves to control the circulating water.

ting down the turbine. Any tube or tubes may be temporarily plugged and other repairs made without taking the condenser out of service.

This condenser enables the engineer to maintain clean condensers, hence a constantly high vacuum, and in addition to increasing output a high vacuum means low fuel consumption and a considerable saving in money.

Also upon installation of this condenser there need be no interference with the operation of the turbine. At the present time it is necessary occasionally to shut down the turbine for a period sufficiently long to give the condenser a thorough cleaning. In such cases this new type will fill a long-felt want. During the wait for an opportune time to clean the average condenser, the vacuum gradually drops, and with the drop coal wastage increases. Sometimes the loss of vacuum amounts to several inches of mercury. Hence the compartment condenser, which can be kept constantly clean regardless of load conditions, will in the long run prove to be a paying investment from the standpoints of both uninterrupted service and coal saving.

To clean the condenser while the turbine is delivering full power, the operator simply shuts off the water from one compartment, removes the cover, cleans the tubes, replaces the cover, turns on the water again, and then passes on to the next compartment, repeating the operation until the four compartments or the entire condenser is clean. Thus, while one compartment is being cleaned, the other compartments are in full operation, temporarily taking over the entire turbine load.

POWER PLANT EQUIPMENT FOR TECHNICAL SCHOOL

The Georgia School of Technology is having installed a full equipment of Westinghouse electrical apparatus, which will afford the student a special opportunity for both basic and constructional training in contact with highly developed electrical apparatus and devices.

The equipment for the school is a practically complete electrical equipment for a small power plant, consisting of the following apparatus:

One 187-kva., 3-phase, 60-cycle, 220-volt a.c. generator driven by a 150-kw. turbine through induction gear. Also a 125-kva., 80% power factor unit of similar characteristics. For condensing the steam from these two turbines there will be supplied one surface condenser. There will also be supplied one 175-kva. coupled type generator suitable for gas or steam engine drive. For excitation of the above a.c. generators there will be provided one 25-kw. d.c. geared turbine exciter unit. For miscellaneous service there will be supplied one motor generator set consisting of a 3-phase induction motor driving a 50-kw. d.c. generator. For furnishing driving power



Power plant at the Georgia School of Technology supplied with complete Westinghouse equipment

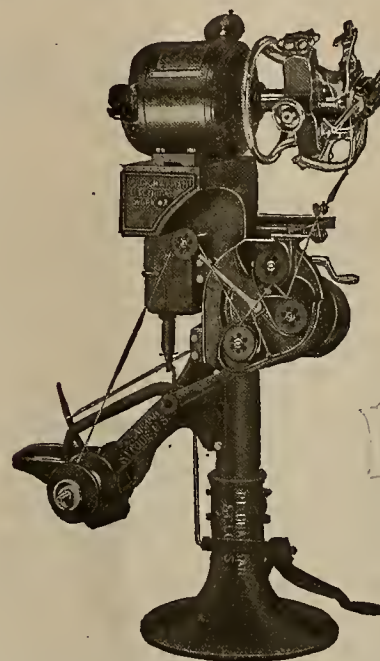
to auxiliaries and experimental work there will be supplied one 15-hp., two 50-hp. and one 100-hp. squirrel cage induction motors. These motors are all complete with reels, pulleys and suitable auto starters of up-to-date design. Three 50-kva., single-phase, 60-cycle distribution type transformers, 220

volts low tension, 2200 volts high tension, one 2-kva. 50,000 volts self-contained testing outfit. One complete switchboard, including an automatic voltage regulator and necessary control for all the above generators and exciters, together with numerous a.c. and d.c. feeders, are also included in the installation.

This equipment is all thoroughly up-to-date and altogether is an excellent exhibit of a modern power plant and distribution system on a small scale.

ARMATURE WINDING MACHINE

The P. E. Chapman Electric Works, of St. Louis, Mo., announces a much more complete model of the Chapman Adjustable Bipolar Drum Armature Winding Machine. This model in addition to being adjustable in a few minutes for any style and size of random wound bipolar drum armatures



This armature winding machine will wind an especially large amount of wire into armature slots without pounding the wire

and any size of wire from No. 20 to No. 36, has some special features enabling it to wind a very great amount of wire into armature slots without pounding the wire, and also has some unique lead forming and handling features, reducing the labor on this part of armature winding.

Driving motor, controller, turn counter and other necessary parts are all integral parts of the machine; in fact, the machine is complete in itself.

A new automatic dynamometer controlled reel holder and tension device has been perfected, which it is claimed stops all spool troubles and enables quick starting, high speed, great tension and quick stops, so that only about five seconds are required to wind in a coil. This reel holder and tension device are simultaneously adjusted for any sizes of wire by a simple crank, and once adjusted need no further attention until the reel is empty. It is said that the announcement of this device has been held back long enough to prove the machine a success in actual practice, in one case an output of nearly 600 per day being obtained where the estimate was 200 to 250. It is claimed that the output of the machine runs into hundreds of armatures per day on many sizes and kinds of armatures; that the saving over hand winding usually is anywhere from 10 to 30 to 1 or even better. It is claimed that the machine is easy to operate, well and strongly built; that it is useful both in the job shop and in the factory. The machine is also useful for winding field coils, smaller armature coils, etc.

Books and Bulletins

National Electrical Safety Code

The Bureau of Standards has issued a compilation of the proposed changes in Part I of the National Electrical Safety Code. These include the rules for the installation and maintenance of electrical supply stations and equipment, classified under protective arrangements of stations and substations, protective arrangements of equipment, rotating equipment, storage batteries, transformers, induction regulators, etc.; conductors, fuses and other cutouts; and switches and controllers, switchboards and lightning arresters. The proposed changes are not radical, but are aimed to make the rules more complete.

The proposed changes in Part III of the Code were distributed for discussion last year. Proposed changes in Part II will be distributed in the near future. In Part IV there will be little or no change.

Malleable Iron

A booklet on malleable iron is being issued by the American Malleable Castings Association of 1900 Euclid Building, Cleveland, Ohio. This association is an organization of malleable iron founders formed for the purpose of establishing a uniformly high standard of quality by cooperative scientific research and education.

Aside from the various laboratories of its members the Association maintained at Albany a Research Department for investigation and experiment, and for the testing and analysis of the daily output of each member of the Association. Impartial tests were made and the results, together with direction for improvement, where the need was indicated, were forwarded to the respective members. So successful has the work of the Association proved that today it is credited with bringing all its members to a high average quality in their product known as "Malleable Castings."

Having accomplished that result the Association, it is said, will continue these daily tests and analyses for the purpose of grading the product of each member. When a member's product has daily met the requirements of the prescribed standard for a period of three months a "certificate of quality" will be issued to that member, who may designate his output as "Certified" Malleable Castings. These certificates will be renewed quarterly where the quality required is maintained.

The booklet on Malleable Iron and its production, which has been prepared by the Association, is mailed free on request.

University Publications

The College of Agriculture of the University of California publishes, as Bulletin No. 308, "Fumigation with Liquid Hydrocyanic Acid" by H. J. Quayle, and "Physical and Chemical Properties of Liquid Hydrocyanic Acid," by Geo. P. Gray and E. R. Hulbirt. Bulletin 309 is "The Carob in California," by I. J. Condit, and "Nutritive Value of the Carob Bean," by M. E. Jaffa and F. W. Albrow.

"Evaporators for Prune Drying," by W. V. Cruess, is Circular No. 213.

Another recent publication is a paper by Elwood Mead—"A Plan for Reclaiming and Peopling the Mesa Lands Bordering the Imperial Irrigation District."

Contributions to the Hydrology of the United States

One of the most important duties of the United States Geological Survey, Department of the Interior, is the investigation of the water resources of the country and the preparation of reports on the best methods of utilizing the available water for public waterworks, domestic, industrial, and live-

stock supplies, for irrigation, for desert watering places, and for the development of power. Every year the Geological Survey publishes a number of water-supply papers relating to both surface and underground waters. In addition to the larger water-supply papers it publishes an annual volume consisting of brief contributions to the hydrology of the United States. The volume for 1917 has just been issued as Water-Supply Paper 425. It consists of the following brief reports, each of which was previously published as a separate pamphlet:

- A. Ground water in San Simon Valley, Arizona and New Mexico, by A. T. Schwennessen, with a section on agriculture by R. H. Forbes.
- B. Ground water for irrigation in Lodgepole Valley, Wyoming and Nebraska, by O. E. Meinzer.
- C. Hydraulic conversion tables and convenient equivalents.
- D. Ground water in Reese River basin and adjacent parts of Humboldt River basin, by G. A. Waring.
- E. Ground water in Quincy Valley, Wash., by A. T. Schwennessen and O. E. Meinzer.

Those who are interested in any of these reports can obtain copies free by writing to the Director, U. S. Geological Survey, Washington, D. C.

Cutler-Hammer Leaflets

One of the new descriptive leaflets recently issued by The Cutler-Hammer Manufacturing Company of Milwaukee, Wis., illustrates the new C-H Hospital Call Switch and shows the method of installing this device in the wall adjacent to the patient's bed.

Another of the new leaflets illustrates the Cutler-Hammer 7720 Duplex Receptacle, which provides two outlets in the space required for one. The small blue print which accompanies this leaflet indicates the location of a number of duplex receptacles in the floor plan of a typical modern home and suggests the many electrical appliances which may be used when sufficient convenient outlet receptacles are provided.

Bureau of Mines

The following list has been compiled by the Bureau of Mines, summarizing the Bureau's publications for July, 1919:

Bulletins —

- Bulletin 165. Bibliography of petroleum and allied substances in 1916, by E. H. Burroughs. 1919. 159 pp.
- Bulletin 176. Recent developments in the absorption process for recovering gasoline from natural gas, by W. P. Dykema. 1919. 90 pp., 20 pls., 30 figs.
- Bulletin 178-A. War gas investigations of the Bureau of Mines, by Van. H. Manning. 1919. 39 pp.

Technical Papers —

- Technical Paper 212. The determination of combustible matter in silicate and carbonate rocks, by A. C. Fieldner, W. A. Selvig, and G. B. Taylor. 1919. 22 pp., 1 fig.
- Technical Paper 216. Vitiating of garage air by automobile exhaust gases, by G. A. Burrell and A. W. Gauger. 1919. 12 pp.
- Technical Paper 217. Saving in coal in steam power plants, by U. S. Fuel Administration. 1919. 8 pp., 1 fig.
- Technical Paper 224. Metal-mine accidents in the United States during the calendar year 1917, by A. H. Fay. 1919. 80 pp.

Only a limited supply of these publications is available for free distribution, and applicants are asked to cooperate in securing an equitable distribution by selecting publications that are of especial interest.

Miscellaneous

S. F. Bowser & Company of Fort Wayne, Ind., issue a little folder which illustrates and describes a Bowser Battery Storage System for Lubricating Oil. The folder can be arranged to show one outfit, two outfits, three outfits, or a battery of four tanks, so that the prospect may understand that he can buy as many units as he requires. The folder will show him how the units of any various capacities line up in uniform manner.

A new bulletin from the Allis-Chalmers Manufacturing Company of Milwaukee, Wis., describes and illustrates the "Fairmount Type Crusher."

The Wellman Seaver Morgan Company are distributing a well arranged booklet describing the W-S-M Automatic Ore Unloaders on the Great Lakes. This bulletin is obtainable from the company free on request.

NEW ELECTRICAL DEVELOPMENTS

(Varied activities are reported from the Northwest, including reclamation projects, new incorporations and plans for increasing the electrical supply. Power plant and transmission line construction, together with extensive irrigation plans are features of development in the Pacific Central District, while the Pacific Southwest and Inter-Mountain Districts both report plans for important extensions and improvements in traction and power lines.—The Editor.)

THE PACIFIC NORTHWEST

SPOKANE, WASH.—The Electric Equipment Company has been incorporated here for \$28,000 by K. G. Harlan, C. O. Hawkinson and Bert Ferris.

FLORENCE, ORE.—The Florence electric plant owned by G. G. Bushman of Eugene was burned, causing a loss of \$10,000. It will be rebuilt.

SALEM, ORE.—The Cascade Irrigation Corporation has been formed here with a capital of \$50,000 by O. B. Hardy, Jr., W. L. Smith and W. A. Burdick.

SPOKANE, WASH.—F. E. Martin will erect a power house at the Edgecliff sanitarium at a price of \$21,000, the contract having been let by the county commissioners.

MONTESANO, WASH.—The electric generator at the plant of the Northwest Electric & Waterworks, supplying electricity to this place and Elma, was demolished in a recent explosion.

SEATTLE, WASH.—Work is to be started at once by day labor on a slow-burning construction, one-story power house for the Campbell Lumber Company, at 2453 West 54th street, to cost about \$6,000.

CASHMERE, WASH.—The Peshastin Ditch Company shareholders held a meeting at which the directors were given authority to enlarge and repair the waterway to such an extent as to provide capacity for at least one inch of water per share.

SPOKANE, WASH.—The Pacific Telephone & Telegraph Company has approved a project covering the rerouting of about three and one-half miles of toll line to a permanent location on a new highway between Lewiston and Pullman, to cost about \$8,000.

SEATTLE, WASH.—A contract for the 70,000 cast shoes for the bands of the 78-inch wood stave pipe line now being built by the city municipal power plant at Cedar Falls has been awarded to the Everett Steel Mills of Everett, Wash. The order weighs 245,000 pounds.

SEATTLE, WASH.—A decision to accept a joint bid submitted by John E. Price & Company, Inc., for \$1,250,000 city light extension bonds and \$790,000 municipal street railway bonds has been reached by the city council, at a price equal to a 6 per cent basis on each \$1000 in bonds, plus accrued interest to date of delivery.

HOQUIAM, WASH.—In connection with the project to secure the paving of Simpson avenue to the east city limits, making it the connecting route through Hoquiam for the Olympic Highway, property owners along the street are considering plans for a boulevard lighting system that they believe will make this, Twentieth and Riverside, one of the most attractive drives in the city.

ASTORIA, ORE.—The Pacific Power & Light Company has closed its deal for the purchase of a 15-acre tract of land on Young's Bay upon which it will commence the construction of a large power, light and gas plant immediately. This was the announcement made by head officials of the company and means that Astoria is in line for a great industrial development. Adequate electric energy for all purposes will be provided in the new power plant and a system of distribution installed that will serve every branch of industry in the lower Columbia river district.

KLAMATH FALLS, ORE.—The first move was taken in what may lead to a complete, com-

prehensive and practical reclamation of the swamp lands of the Lower Klamath lake, when F. Hill Hunter of the Sawmill Engineering and Construction Company made a verbal offer to the directors of the Klamath irrigation district to handle the project and take bonds of the district for the work. Hunter submitted his proposition in writing at a meeting. In general outline Hunter proposes to survey the lands embraced in the district, map out a plan of reclamation, irrigation and drainage and prepare specifications on which the district may proceed to operate and ask for bids.

EVERETT, WASH.—The sum of \$2,000,000 would be required to finance the proposed municipal power plant, according to an estimate submitted to the city commissioners by Burns & McDonnell of Kansas City, consulting engineers who were called into consultation with the commissioners on the plan. Of this it is estimated that \$1,180,000 would be necessary for the hydraulic power plant on the Sultan river. There would be \$410,000 for the construction of an auxiliary steam plant and the remainder would be devoted to the purchase of the present system of the Puget Sound Electric & Power Company. An estimated total of \$1,590,000 would be involved in new power plant construction. A bond issue proposition may be submitted with a view of carrying out the program.

BANDON, ORE.—The possibility of a municipal electric power plant for Bandon was the main source of discussion at a recent meeting of the city council and it was concluded that the proposition warranted an investigation. It was arranged for Mayor Topping, a number of councilmen and a committee of citizens to accompany a competent engineer on a trip to the Elk river country in northern Curry county for the purpose of looking over proposed sites that have in the past been considered by private interests. It is well understood that something must be done here if the city is to retain electric lights and power, as the condition of the Bandon Power Company is such, due to the fuel situation, that the service cannot be maintained with certainty for any length of time. The plant is operated at a loss which cannot be continued indefinitely.

SEATTLE, WASH.—With the hope of increasing the city's output of electric power at the earliest possible moment to supplement the present inadequate supply, the Board of Public Works has issued a notice to dealers and manufacturers calling for bids for hydroelectric machinery and other equipment for use at both the Lake Union steam plant and Cedar Falls, estimated to cost about \$200,000, funds for the equipment having been appropriated by the city council. Bids for the materials needed at Lake Union will be received up to 10 a.m. October 3, and figures on the Cedar Falls plant equipment up to 10 a.m. October 17. It is proposed to install a 10,000-kw. unit including boilers, generators and all necessary auxiliaries at the Lake Union plant, and to extend the present fireproof building to accommodate the same. Approximately \$1,250,000 in bonds has been appropriated for the work contemplated at the auxiliary steam electric station at Eastlake avenue and Nelson place. At Cedar Falls a new 10,000-kw. water wheel and generator is to be added which with the new pipe line from the dam to the power plant will approximate a cost of \$750,000. Proposals will be received for the combined unit

of turbine and generator set for both the main unit and exciter set. Bidders not wishing to submit figures for the combined unit may quote on either water wheels or generators.

THE PACIFIC CENTRAL DISTRICT

CORCORAN, CAL.—Manager J. B. Carter states that the San Joaquin Light and Power Company will soon spend \$80,000 in improvements on the local system.

OROVILLE, CAL.—Plans for the complete irrigation of the Berkeley olive groves of 1000 acres are under way and a contract for 10,000 feet of 6½ in. concrete pipe has been let.

BYRON, CAL.—A petition has been issued here for the organization of an irrigation district to be known as the Byron-Bethany Irrigation District, situated in Alameda, San Joaquin and Contra Costa counties.

SAN JOSE, CAL.—The Supervisors have granted permission to the Campbell Water Company to lay a one-inch pipe line across and under the Santa Clara and Los Gatos Road, under the supervision of the County Surveyor.

TAFT, CAL.—About three miles northeast of the Hay lease, a location has been made for the drilling of a new well by the Standard in the H. I. Tupman property. This is on the extreme north side of Ell Hills not far from the plant of the Western Water Company.

COLUSA, CAL.—All preliminary work in connection with the organization of the Glenn-Colusa irrigation district, comprising about 100,000 acres, has been completed. The petition for signatures is now in the hands of the printer and will be circulated immediately.

HAYFORK, CAL.—At a public meeting here, John B. Enos, John Romke and R. W. Cuff were appointed a committee to raise \$1000 by public subscription, the money to be used in making a preliminary survey and determining the approximate cost of the proposed Hayfork Irrigation District's project.

MAYFIELD, CAL.—At an adjourned regular meeting of the Mountain View board of trustees, held last week, an ordinance calling a special election for the purpose of voting on a proposition to issue \$30,000 worth of the bonds of the municipality to establish an electric light and power system, or purchase the present system owned by the Pacific Gas & Electric Company, was passed.

OROVILLE, CAL.—Construction camps are now being built by the Great Western Power Company in the outskirts of Oroville, preparatory to construction of a second tower line through this section extending from Las Plumas to San Francisco. The new line is being built in anticipation of the completion of the Caribou plant near Belden, which is expected to generate power the latter part of 1920. The new line will be the same as the present one, having steel towers imbedded in concrete.

CALIPATRIA, CAL.—An election was held in Imperial Irrigation District, September 16, to vote on the question of issuing bonds to the amount of \$2,000,000 for constructing irrigation canals and works. Said bonds payable as follows: At expiration of six years from date of issue, 4 per cent of whole amount of said issue; at expiration of 7 years, 6 per cent of whole amount of issue; at expiration of 8 years, 8 per cent of amount of issue; at expiration of 9 years, 8 per cent of issue, etc.

RIO VISTA, CAL.—Plans are being completed for the construction of a 22,000-volt power line, costing \$20,000, from Hood to Franklin by the Great Western Power Company. Franklin is ten miles south of Sacramento and the distributing lines about town will cover twelve miles. Most of the power will be used for pumping water, which is needed because of the big agricultural development in the Franklin district.

SUCCESS, CAL.—The recent meeting of the South Tule Independent Ditch Company brought highly satisfactory results. It was voted to proceed with a plan to utilize the water of the South Tule river by means of a dam either at the weir near the Reservation, or the Frank Howard place farther down. Hobart A. Webster, E. A. Fisher and Robert Horbach were appointed the committee of investigation, and a preliminary report made by Civil Engineer H. H. Holley of Visalia. The cost will probably amount to \$60,000 and a new company offspring for sale of stock in the proposed dam may be formed.

SACRAMENTO, CAL.—Returning from a tour of central and southern counties, State Engineer W. F. McClure announced that he had approved the plans of the Madera irrigation district, whereby 200,000 acres will be brought under irrigation. A gravity type concrete dam 310 feet high and 3900 feet long at the top will be constructed to impound the waters of the San Joaquin river, creating a reservoir with a capacity of one million acre feet. Two small dams near San Diego and four dam sites for the Los Angeles flood control district were inspected. McClure reports great activity throughout the state for conservation, as a result of the dry year.

CORNING, CAL.—Chief Engineer Tempest is again in Corning, working on the Iron Canyon irrigation canal lines. Tempest has a crew of eight men, running the line and making the necessary blue prints. There have been three former surveys which were temporary in their nature, but the work now being done is that of locating the final and permanent line of the main canal from the great reservoir north of Red Bluff, and which runs two and a half miles west of this city. The work of making this permanent survey will require six weeks or two months, during which time the party of surveyors are making their offices in the Woodson building.

MODESTO, CAL.—Attorney J. M. Walthal has been instructed by the Modesto Irrigation District board of directors to prepare petitions to be circulated for signatures for a special election to vote about \$2,000,000 in bonds for construction of the Don Pedro project, with a power plant and also for the enlargement of the present canals and extension of the drainage system. The day of the election will be inserted as soon as the board has determined it. Turlock Irrigation District will call a special election to vote over \$3,000,000 in bonds as its share in the Don Pedro project, power plant, enlargements of canal and drainage. The two districts are conducting the enterprise jointly.

OKDALE, CAL.—H. F. Jackson, president of the Sierra and San Francisco Power Company, has written a letter to the Oakdale and South San Joaquin irrigation districts, agreeing to consider the proposal made for the construction of a \$3,000,000 reservoir, for which the districts would furnish the bonds, and the power company would pay them off. The proposed reservoir is to be at Donnell's Flat. Operation and maintenance would be borne on equal basis by both parties, and all properties, including water rights, will remain the property of the districts until bonds are paid off. The power company agrees to stop all litigation pending or contemplated against the districts on the water rights on Stanislaus river.

PORTERVILLE, CAL.—Following the announcement that the South Tule Independent

Ditch Company, which supplies water to the Success district, had adopted plans for conservation of the amount of water they have appropriated from the Tule River, the officers of the Tule River Water Appropriators' Association have disclosed that they have had under consideration for some time a comprehensive plan of water storage. Aid has been sought of the United States Reclamation Service and of state officials, for drafting of plans for conserving the entire amount of water on which filing has been made, amounting to about 8000 miner's inches. Papers are now being drawn for an organization which will include upwards of 50 individual users and incorporated ditch companies.

THE PACIFIC SOUTHWEST

LONG BEACH, CAL.—An application for a franchise to construct tracks and operate cars in the harbor district has been submitted to the commissioner of public works by the Pacific Electric Company.

PASADENA, CAL.—Service has been inaugurated direct from Pasadena to Sierra Madre by way of Colorado street, and two more cars have been added on the Los Angeles lines, as a result of the recent strike.

LOS ANGELES, CAL.—Fire which broke out in the Pacific Electric Company shops at 7th and Alameda streets did damage estimated at \$150,000 before it was checked. The cause of the fire has not been determined.

BLYTHE, CAL.—The sale of \$800,000 worth of bonds for completing the Palo Verde system to the county line this fall, and the construction of a railroad along its top, was approved by the Levee Board at its last regular meeting held at Blythe. A. L. Hobson, who promoted the Palo Verde irrigation project, is interested in the proposition.

ALBUQUERQUE, N. M.—Chas. G. Wilfond, president of the Rio Grande Light, Heat and Power Company in the White Rock Canyon, has received the report of Waldo C. Cole, commercial engineer of the Westinghouse Electric Company, on the construction of a great hydro-electric power plant in White Rock Canyon. The report states that the project is feasible, and construction work will be started soon. Plans call for a power and light proposition only. A power dam and a supplementary steam plant will be constructed.

LOS ANGELES, CAL.—Municipal ownership of the Los Angeles Railway Company lines was under discussion by the city council, following recommendation by the finance committee of the body that the question be put to the people. The Railroad Commission has placed a valuation of \$30,000,000 upon the street railway lines, but it is understood the company values its system at \$40,000,000, and approximately this sum would have to be voted in a bond issue. The municipality would operate the street car lines only within the limits of the city and there is no intention of purchasing the Pacific Electric system.

CALIXICO, CAL.—Assurances of state and national cooperation with the valley in opening the mesa under a supervised settlement plan, and in the construction of a canal and water works to carry an adequate water supply to the present Imperial Irrigation District, are contained in a letter received from Dr. Elwood Mead, chairman of the State Land Settlement Board and consulting engineer to the Secretary of the Interior. It is estimated that \$50,000,000 must be raised and spent. He states that if the government raises the money, the reservoir and main canals should be built by the U. S. Reclamation Service.

THE INTER-MOUNTAIN DISTRICT

NAMPA, IDA.—The Nampa Chamber of Commerce is considering the installation of a boulevard lighting system to replace the lights now in use.

RIRIE, IDA.—The Public Utilities Commission has requested the Utah Power & Light Company to extend its lines to serve this town, which has a population of approximately four hundred people.

WESTON, IDA.—A certificate of convenience and necessity to permit the extension of its lines to Weston, Franklin county, has been filed with the Public Utilities Commission by the Utah Power & Light Company.

OGDEN, UTAH.—Work is progressing nicely on the establishment of the Weber Irrigation District, which tract contains approximately 125,000 acres in Weber county. It is expected that this project will require a considerable amount of electric power for pumping.

MISSOULA, MONT.—The remodeling of the Missoula Light & Water Company's power dam in the Missoula river near Milltown will cost about \$85,000, according to H. L. Bickenbach, superintendent of the street railway here, who will have charge of the work.

DUBOIS, IDAHO.—The village council has entered into a contract with the Western Electric Company for the purchase of all appliances to be used in the construction of the local electric light and power system. The contract for the construction work will be let in the near future.

LOGAN, UTAH.—Bids for the construction and installation of the ornamental street lighting system for this city were opened by the City Commission on September 12. All bids were rejected on account of being too high. Other contractors are being urged to bid on the work.

YERINGTON, NEV.—The board of directors of the Walker River irrigation district has fixed September 20th as the date for holding an election to decide whether or not the directors shall be given authority to issue bonds for raising money for constructing reservoirs and purchasing land, the necessary amount being \$918,500.

BOISE, IDA.—The state department of reclamation has awarded a contract for improvement to be done on the south fork of the Snake river to David A. Saunders, of Idaho Falls. The last legislature appropriated \$30,000 for the work. A dike will be built in Madison county by Saunders to prevent spring overflows and deepen the channel of the stream.

LOVELOCK, NEV.—Lack of water for electric power at Lahontan has forced closing of the Rochester Combined, Nevada Packard and Mill City Tungsten mines, and other plants contemplate suspending operations. Only sufficient power is available to furnish electric lighting for Lovelock, Hazen, Fallon and other cities supplied by the Nevada Valleys Power Company.

BOISE, IDA.—Water in Yellowstone Lake in Yellowstone National Park can be directed into the Snake river for irrigation purposes, W. G. Swendsen, commissioner of reclamation, told Governor Davis in a report filed with him recently. Only a preliminary examination of conditions has been made, but the commissioner is of the opinion that approximately 800,000 or 1,000,000 acre-feet of water which is now going to waste in the Missouri river can be brought into Idaho and stored in reservoirs in the upper Snake river valley and diverted to arid lands.

OGDEN, UTAH.—Application of the Uintah Power & Light Company for a preliminary permit for construction of an electrical generating station on the Uintah river, which will furnish four thousand horsepower, has been received by the district engineer of the U. S. Forestry Service, this city. The plant would be situated on the Uintah river in the Ashley forest and distribute power to all of the towns in the Uintah basin. The company already has a small plant in that section. The application is designed to secure priority on the water which will be taken directly from the river without storage. If the permanent permit is granted the right of occupation for fifty years is granted.

JOURNAL OF ELECTRICITY

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PER COPY, 25 CENTS



To the Readers of the McGraw-Hill Electrical Publications

On page 339, the first editorial page of this number, you will find the announcement by the publishers of Electrical World, Electrical Merchandising and Journal of Electricity which explains why the 30,000 subscribers of Electrical World and Electrical Merchandising, are receiving this issue of the Journal of Electricity.

Read page 339

Through the courtesy of the Simplex Electric Heating Company, their advertisement scheduled for the front cover of this issue has been transferred to page 19 and this space released for the above announcement of the McGraw-Hill Company.

The VISION of 1920



THE tantalizing waterfalls of the West have a message to all those who hold in mind the highest development of our wonderful natural resources. So forceful is this appeal being made in facts and figures by leaders of the electrical industry in the West that each individual, whether he be a manufacturer of overalls or the toiler in the field of agriculture, can see that

just so fast as the kilowatt of energy is harnessed in the mountains of the West, and no faster, will the progress of the West go forward.



The beauty and grandeur of the waterfall shown in this frontispiece — the Wahkeena Falls along the famous Columbia Highway — in a way symbolizes the thirty-five millions of undeveloped horsepower of the West in possible service to the nation.



The Pacific Coast Section N. E. L. A., and the Northwest Electric Light and Power Association in its recent convention at Seattle, have unloosed a discussion of self-interest in its relation to power development that is formulating a vision for 1920 in affairs electrical which will make the great N. E. L. A. convention to be held in Southern California the middle of May fairly vibrate with possibility of accomplishment. Men of the electrical industry throughout the nation are already planning to attend this great convention and in its wonderful setting and achievement there will not be disappointment.





JOURNAL OF ELECTRICITY



DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43

SAN FRANCISCO, OCTOBER 15, 1919

Number 8

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To the Readers of the McGraw-Hill Electrical Publications

ELECTRICAL WORLD and Electrical Merchandising have been forced to suspend publication because of a printers' strike. In New York, on October 1, the printing presses stopped. Our publications, Chemical and Metallurgical Engineering, Engineering and Mining Journal, Engineering News-Record, Coal Age, Power, Electric Railway Journal, La Ingenieria Internacional, Electrical Merchandising, Electrical World and American Machinist, have been appearing regularly, some of them for more than 40 years. We regret that in this time of prosperity we have been compelled to announce that they will not appear.

We will resume when we can. This announcement is being sent by telegraph to our publishing offices in San Francisco. We hope that by the time this issue of the Journal of Electricity reaches you we will have resumed publication of Electrical World and Electrical Merchandising.

A Dramatic Period in the Electrical Industry

The suspension of our activities comes at a particularly dramatic time in the affairs of the electrical industry. Every activity, following curtailment by the war, has been resumed with full speed. The fall season is

immediately before us and the plans of manufacturers, engineers, central stations, jobbers, contractor-dealers and their associations are being developed week by week. As editors we feel a very real responsibility to the readers of our publications to get the news and the policies of these far-reaching changes before you. And it is particularly unfortunate that at a time when the opportunities for service are so great we must hold back that service.

Pending a resumption of our printing facilities we have increased our letter duplicating equipment and each subscriber of the Electrical World and Electrical Merchandising is being sent a letter from the editor touching the high spots in the week's developments.

Opportunities for Editorial Service Never Greater

The year ahead should be one of the most fruitful in the history of the industry. The plans of President Ballard of the National Electric Light Association for the strengthening of the geographic sections are going forward apace. The committees of the association are organizing for the work of the year and it is especially significant that there is a desire to cooperate and coordinate the activities of this association with those of



San Francisco—Home of the Journal of Electricity

other associations and societies. The American Institute of Electrical Engineers and the Illuminating Engineering Society have before them an unusually active year. The work of the development committee of the American Institute has placed before the membership definite issues of service and opportunity and much of the future strength of the Institute depends on its action on these important matters.

In the trade field, business is very active and the opening up of the construction field and the continued expanding of the appliance market indicates another year of merchandising growth. The real problem ahead in this field seems to be the one of financing hundreds of thousands of dollars in time payments on appliances.

Staffs of Electrical Publications Expanded

The editorial staffs of *Electrical World* and *Electrical Merchandising* have had a busy summer. Very few weeks have been spent in the office. Our editors have visited the South, the far West, and our staff in Chicago have large expense accounts because of the completeness with which the Middle West has been covered out of that city.

In the far West, as has already been announced, the *Journal of Electricity* has been purchased by the McGraw-Hill Company, and the former staff of the McGraw-Hill Company on the coast has been increased by the addition of the staff of the *Journal of Electricity*. The editor of the *Journal*, Mr. Robert Sibley, becomes also Pacific Coast Editor of *Electrical World* and *Electrical Merchandising*.

A United Press Behind a United Industry

The *Journal of Electricity* will continue to specialize in the editorial treatment of the detailed problems of what has been called the "far West" in engineering, in power development and sales and in merchandising development under the different geographical and trade conditions which will continue to demand this specialized treatment. *Electrical World* will present to the industry as a whole those problems in whose solution the whole industry must take part, in public relations, in engineering, in general commercial policies. To the readers of the West, in turn, *Electrical World* will bring the best of Eastern practice of engineers, central-station men and manufacturers.

Electrical Merchandising also will continue to serve in its field nationally, promoting interchange of methods and principles in the field of selling, bringing to readers on the Coast the best ideas of manufacturers, jobbers, dealers and contractors in the East and promoting nationally the spirit of practical cooperation the West has so well shown the value of.

The coordination of electrical and publishing activities will enable the three publications to broaden and deepen their helpfulness to their readers. It means bringing East and West into closer contact than ever before. It means more intimate presentation to the country as a whole of the problems and conditions peculiar to the Pacific Coast. It provides a means for most effectively serving local needs on the Coast. Through this better



New York City — Home of Electrical Merchandising and Electrical World

understanding of the East and West, which the affiliation of the three papers is designed to promote, the industry will be able to present a united front to the engineering and trade problems of reconstruction which are occupying the minds of the thinking men of the industry.

Our own case is simply an example of the larger case of the world. We must elect be-

tween personal expediency and duty, between private gain and public interest. We feel that it is the duty of every sane thinker in these days to curb the tendency to radicalism which cannot but bring us to disaster.

In the West the ideal of utility service has been awakened to such an extent that the president of one well known state regulatory body found himself in his public utterances almost incapable of believing that such ideals could be possible of sincerity of expression. Those of us, however, who have been with these men, sat in their meetings and listened to their talk, become imbued with the fact that not only are such utterances sincere but today these men are themselves earnestly setting about to put these utterances into practical application.

In this regard the statement of D. L. Huntington, president of the Washington Water Power Company, in a recent address before the Seattle convention of the Northwest Electric Light and Power Association is of especial note. Mr. Huntington stated that utility executives should be especially careful in public interviews and public statements of every sort to give whole truths and in no way attempt subterfuge or part truths in discussing matters of vital interest to the public.

The Journal of Electricity has utmost confidence in the sincerity of expression of men high in the councils of affairs electrical in the West, and furthermore, we believe every reasonable effort is being made to put these ideals into practice. The splendid vision of S. M. Kennedy, general agent of the Southern California Edison Company, which is being put to words in a specially prepared series of articles, begins with this issue of the Journal of Electricity. We believe Mr. Kennedy today stands forth as a national figure preeminent in visualizing the matter of public relations and we believe that this series of his will become a tradition in the annals of American utility evolution.

Responsibility of Publisher to Readers

We feel a real sense of our responsibilities to our readers. As editors we have a singular opportunity to be both a part of the industry and to see also the industry as a whole. What we all need in these days of stress is a sense of where we are going. Leadership was never more needed in the world than now. We need sane thinking. We need the expression of sane thinking and it seems the especial responsibility of journals of industry to report and interpret these movements in thought today. We have mailed this issue of the Journal of Electricity to the subscribers of Electrical World and Electrical Merchandising because we want to hold together during this period the family of sane thinkers who are represented by our readers.

Throughout the West many large hydroelectric developments are under way. To give some conception of the magnitude of these projects, a summary of work in California is interesting.

**Developments
Now in
Progress**

At the present time there are under way hydroelectric developments and transmission line construction in California which total an expenditure of \$22,000,000, and will render available within two years an additional 120,000 kilowatts of generated capacity.

In addition to these new generating plants, several hundred miles of high tension transmission are now under way, including a substantial constructive effort on the great Hetch Hetchy project for the city of San Francisco. With unlimited possibilities for ever increasing uses of hydroelectric energy and a vast store house of thirty-five million undeveloped horsepower—seventy per cent of the undeveloped power of the nation—lying within its confines, the section of our country West of the Rocky Mountains is indeed fortunate.

In the West where fuel oil is used in the generation of steam electric power many notable records in steam power plant economy have been established. In the Journal of Electricity, August 1, 1919, editorial comment was made concerning a new world's record in boiler economy recently established by C. R. Weymouth in the operating of certain power plants in Arizona wherein a hitherto unapproached economy of 333.3 kw-hr. per bbl. of oil was registered.

It is a well known fact that losses due to radiation in the boiler setting often greatly hamper economy in steam power generation. During the war period much study was given to this important subject. Records of tests show that in places where standard uninsulated settings were registering losses of 840,000 B.t.u. over unit areas, the same unit areas registered but 314,000 B.t.u. losses when properly insulated.

On another page of this issue will be found an extended discussion of this important subject. It is to be hoped that more attention will be given to a study of stray losses in the boiler and furnace setting such as those due to radiation, as it is believed that the average economy of many of our steam electric plants will thereby be materially bettered.

The mellowing influence of a broad sympathy is the one healing balm that may be applied to world problems today with reasonable hope that immediate results will follow in stabilizing industry and in the bringing about of the return of a certain sense of poise and promise to millions of hearts that the disasters of war have rent asunder. To every citizen there is much for reflection in the great issues now before the American nation in regard to the adoption of the treaty and the consequent adoption of the proposed league of nations. But to the quantitative mind of the engineer the problem perhaps strikes with more force

than others, for the engineer knows full well that no constructive effort is possible without some equipment wherewith to put in motion the great task of world readjustment that even now should be in full swing the world over, in so-called enemy centers as well as in friendly nations.

The greatest engineer of this generation, Herbert Hoover, fresh from the economic problems of the world in which he has played the part of chairman of the supreme economic council, says that each day's delay in the ratification of the peace treaty means so much more disaster to the world. While admitting its imperfections, this brave engineer yet sees in it the only possible tool for immediate constructive effort. But deep down within our own individual consciousness we each know of our own perception that it is the spirit of the treaty and proposed league that is the saving grace of any possible getting together of nations in this broader way. We got together during war, now let us in that same broad sympathy and yearning for constructive effort get this working tool put into action, and such broad sympathy will not lead to disaster but indeed presents the only channel for establishment of world confidence.

The question now before practically every engineering society—local or national—is as to what part the engineer of today may play in the vast economic problems that must be solved in order that the new world, now in the making, may find itself on stable and secure footing.

**New Opportunity
Before the
Engineer**

Conservation of national resources, especially conservation of our fuel supply, constitutes a problem of prime present day interest. What are we to do about our rapidly depleting coal and petroleum supply is a burning question to every one who follows the trend of present day analysis of conditions threatening the nation. Let our engineers step forth and give their best in offering to the public statistics of this nature. In this regard electrical engineers of the West are to be commended for their splendid beginning in making a study of steam railway electrification.

Engineers from practically every specialized field involved in this problem are in one important center of the West giving of their best to gather data on this important subject. On another page of this issue, the preliminary report of F. H. Fowler, an eminent engineer of the Forest Service, is published as the beginning paper of a series that will follow by other specialists who are voluntarily engaged in this work under the auspices of the San Francisco Section of the American Institute of Electrical Engineers.

Let engineers in every nook and corner of our nation awaken to this higher sense of the needs of the hour. Without this broader vision the engineer must fall back into a narrow unproductive class, unworthy of the splendid traditions of years just ended wherein the world was saved for democracy largely through his efforts. The opportunity is here for big things and it is believed the awakened engineer of today will never be found wanting.

**As to the League
of Nations**

The recent Pacific Coast Convention of the American Institute of Electrical Engineers brought out, in discussion of a proposed 220,000-volt bus-bar for California, a decidedly interesting fact—that engineers and large industrial users now look forward to the time when sixty-cycle generation, transmission and distribution will be universally adopted throughout the West. Certain lines of the Southern California Edison Company now alone remain under the fifty-cycle system although one of the Kern river plants of this company is already made to accommodate sixty-cycle current or fifty as occasion may arise.

Unquestionably the trend of the times is toward higher voltages in transmission and the interconnection of all the vast network of power lines in the West. Hence from both the operating and economic viewpoint, the standardization looking toward the complete adoption of sixty-cycle current is most desirable.

Electrical supply jobbers are watching with considerable concern the constant advance of the cost of doing business and the consequent decline in profits. Should these two curves intersect, and subsequently the cost of doing business rise higher than profits acquired from the business, of course disaster must follow. One of the best ways of heading off such a contingency as this is to stop the leaks involved in distribution.

Statistics show that the small order is the bogey that constantly stands in the way of keeping profits up and the cost of doing business down. Electrical supply jobbers will of course at all times handle gladly the small order with the same service that the large order is handled, yet contractor-dealers should bear in mind that fifty per cent of the jobbing orders are losing transactions and by more forethought on the part of the contractor-dealer this situation may be materially bettered. Here is one practical means of cooperation among two branches of the industry and it is believed that when this situation becomes fully known among contractor-dealers at large an instant response will be manifested.

Labor conditions throughout the nation are equally in a state of unrest, irrespective of locality. In the West, construction work on certain large power installations has been seriously hampered due to the quick turnover in labor. In many instances investigation shows absolutely no cause of complaint and the laborer,

acknowledging that food, camp, work, and all factors involved are subject to no cause for complaint, asks for his time, in order that he may, with purse temporarily filled with large wage returns, satisfy his restless spirit of moving on to the next camp or idle away his time as long as his easily saved earnings will carry him.

While all this is true in the main, still it is well to remember that care in camp installation and in food served do go a long ways toward making satisfied laborers and lessening the probability of early turnover.

The San Joaquin Light & Power Corporation are particularly to be congratulated upon their effort in this regard. By paying attention to such details as seeing to it that delicious ice cream may be bought at the commissary in the hot mountain camps, they are materially improving their labor turnover.

The inauguration of the pensioning of employes, soon to be effective in the rank and file of the great Southern California Edison Company, is a step which certainly will have a magnificent effect in stabilizing the organization as a whole and will make for permanence and satisfaction throughout the entire system.

Should the wholesaler sell at retail? This important question was recently very ably handled by a prominent electrical supply jobber before a representative gathering of contractor-dealers in San Francisco. The thought was developed that the electrical supply jobber has a definite responsibility to the public and to the manufacturer he serves, and that, while electrical supply jobbers can now practically put upon their doors the sign "Wholesale Only," still there must be patience on the part of the contractor-dealer for the complete fulfillment of this ideal. The jobber must be permitted to dispose of certain lines he now carries so that his principal may not suffer through improper or inadequate distribution of his ware to the public.

To attempt to control the channels of trade is as impossible as it is to stem the incoming tide of the ocean. In the West, especially in California where the California Electrical Cooperative Campaign is now in full swing, vast advances are being made in the economic distribution and merchandising of electrical ware. A little patience has at all times proven necessary, however, before ultimate results desired are finally brought about. It is believed that the electrical supply jobber is now doing everything reasonably within his power to bring about the day when the sign "Wholesale Only" on his door shall become a reality, and the appreciation of this fact will go a long way toward speeding the day of complete realization of this desired result.

IN THE NEXT ISSUE: Electrical Practices and Electrical Opportunities in the Pan-Pacific Countries.

Seattle Convention of Northwest Light and Power Association

(The conventions held by the Electrical Industry never fail to bring forth something of vital importance and much interesting discussion. The recent enthusiastic gathering of the Northwest Electric Light and Power Association at Seattle was no exception to this rule, as the following review of some of the outstanding features will show.—The Editor.)



Even Bill Berry, the stately gentleman from Kentucky who is western salesmanager of the Western Electric Company, with headquarters in San Francisco, knew what walking was like when the California delegation had to hike around the caved-in tunnel at Kennett and change cars enroute to the north.

HE convention of the Northwest Electric Light and Power Association held in Seattle, Sept. 24-27, 1919, will go down in the history of power development in the great Northwest as ushering in a new vision of affairs electrical in that section of the nation. The outstanding features of this gathering were the enthusiasm expressed over the forthcoming National Electric Light Association convention which is to be held in Southern California the middle of May, and the decision to send a special train from the

Northwest to this convention in order that the entire West may unite to make 1920 the year of years for the electrical industry in the West.

In the discussion of the National Safety Code, the paper of Geo. E. Quinan, chief electrical engineer of the Puget Sound Traction Light & Power Company, brought new light on this interesting situation that has so long perplexed the West, while the subject of industrial heating load will unquestionably

receive a new impetus in development of electrical load of this nature in the Northwest.

Public Utility Problems —

By far the most important paper of the convention proved, however, to be that of W. H. McGrath, vice-president of the Puget Sound Traction Light & Power Company, on the value of public utility war experiences and their effect on the future. The paper brought out the liveliest kind of discussion. D. L. Huntington, president of the Washington Water Power Company, showed that taxation is going up by leaps and bounds, that too low revenues are being received to bring about financing required for needed extensions, that this cost of money affects municipal enterprises as well and that the new high cost of service will have a definite bearing on future development by necessitating larger replacement reserves. He urged national and local advertising which would set forth the difficulties and achievements involved in construction of power plants, the installation of pole lines and the establishing of the splendid engineering feats involved in such work as being one means by which the public could be better informed. He was most emphatic in his statement that only whole truths should be given out to the public or none at all in discussion of the problems involved in public relations and public policy.

S. M. Kennedy, general agent of the Southern California Edison Company, emphasized the fact that the understanding of the utility problem on the part of the public is absolutely necessary. He suggested that the problem be attacked from the center out



The convention of the Northwest Electric Light and Power Association at Seattle, Sept. 24-27, 1919. In the center, standing in light-colored suit, may be seen O. B. Coldwell, always the life and charm of any convention he attends, besides being a leader of many years in Northwest Association matters. Five delegates to the right, front row, may be seen. H. J. Gille,

president of the convention, to whom must be given the credit of putting over perhaps the most helpful convention ever achieved in the annals of the Northwest Electric Light and Power Association. Three figures to the left of Mr. Gille appears "Tam" McArthur, the general manager of the Pacific Power & Light Company, a live wire among the younger generation.

to the circumference; that the employe, the industry and then the public was the order best suited for effective results. Thus, missionaries for the work



And here are some of the woe-begone delegates from the South, forced to change cars at the tunnel mix-up and spend some time in a real hike around the tunnel to catch another train. They are, from left to right: J. E. Johnston, E. B. Criddle, D. E. Harris, A. E. Wishon, Harry Noack and Ben Maddox, with Sam Kennedy, general agent of the Southern California Edison Company, fast receding on the extreme left, with just a part of his head showing.

were created, who when well informed, would be sincere and honest workers in behalf of public enlightenment.

O. B. Coldwell, superintendent of the Portland Railway, Light & Power Company, showed that lack of information on the part of the public at the critical time often proved disastrous and advocated a system similar to the California Electrical Cooperative Campaign in California in which the support of the contractor-dealer element had been secured.

A. E. Wishon, assistant general manager of the San Joaquin Light & Power Corporation, forcefully presented his self-interest method of attack as given in full in the Journal of Electricity for Sept. 15, 1919. The message made a deep impression on all who heard it.

D. E. Harris, vice-president of the Pacific States Electric Company, showed how his company is preparing to feature the problem of the central station by a consistent series of facts and arguments soon to appear under the name of his company in the advertising columns of Electrical Merchandising and the Journal of Electricity.

Robert Sibley, editor of the Journal of Electricity, being called upon by the president of the convention to summarize the discussion, called attention to the necessity of selling this idea of the utility problem to the public by means of all the combined channels of expression generally used in the selling of physical electric supplies—by advertising in the national magazines, the technical and trade press, the house organ, the local press, the cooperative campaign, the employe, and by all means the personal contact and expression of a united industry.

Improving Electrical Merchandising —

"Methods of Improving Electrical Merchandising," which was the subject of the Thursday morning session, brought out some very interesting discussion. The salient points of the various plans undertaken were:

(1) Quick turnover is a desirable and economic feature. (Rely on the jobber to carry your stock, but give him advance information on requirements wherever possible.)

(2) Bonus plan for store sales is very successful.

(3) Employees other than salesmen should be encouraged to make sales, by liberal commissions. This not only increases the actual sales, but creates a more friendly public attitude.

(4) Where time payments are made by the customer, the plan of discounting the customer's paper, at banks which support this plan, was brought out as desirable.

(5) The preference of the customer to make appliance purchases through the dealer instead of through the central station, probably because of the more individual service rendered.

Ranges and Water Heaters —

The discussion on Thursday afternoon brought out the fact that the range and water heater business is one which must be individually fitted to the locality. Scattered installations requiring special investment for each range are too expensive for profitable operation. The load must be concentrated as much as possible, so that several ranges can be served by the same equipment. That this can be accomplished, and good service still maintained, was shown in the papers on diversity and demand factor.

Interesting data were presented on the cost of supplying service to such installations. The rates



Here is how Portland delegates, by means of delightful parties up the wonderful Columbia river, entertained many of the guests of the Seattle convention enroute from the north. The scene is that of Multnomah Falls on the Columbia, and in the view from left to right are: O. B. Coldwell, Mrs. C. P. Osborn, J. F. Orr, Mrs. J. F. Orr, A. E. Wishon, Mrs. A. C. McMicken, Robert Sibley, and C. P. Osborn.

which have previously been charged for this class of service were based to compete with other forms of fuel. The consensus of opinion seemed to be that this was not necessary, and that a higher rate could



Shasta Springs and its sparkling waters, with the little miniature water wheel shown on the left, had real visions of promise for that thirsty feeling experienced by E. B. Criddle, of the Southern Sierras Power Company, and Ben Maddox, of the Mt. Whitney Light & Power Company.

be charged, because of the additional advantages which electric cooking has over other methods.

Electric Heating —

The discussion on Friday afternoon brought out the fact that electric heating load in the industries is very desirable from the central station viewpoint. A. C. McMicken showed that in such installations the rate is only a secondary consideration. For instance, in the manufacture of oxygen and hydrogen, which is almost wholly an electrical process, he showed that but 5% of the cost was involved in the actual energy bill. D. L. Huntington emphasized the necessity of showing where the electrical process was better from the manufacturing standard—that a better product was the result, and that equipment stood up better under the method electrical. Summarized as a whole, the consensus of opinion seemed to be that the industrial heating load is a most desirable one to go after.

The complete attendance at the convention was as follows:

12TH ANNUAL CONVENTION, NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION

H. J. Gille, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
W. E. Herring, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
Geo. D. Brown, Wenatchee Valley Gas & Elec. Co., Wenatchee, Wash.
W. R. Thomas, Wenatchee Valley Gas & Elec. Co., Wenatchee, Wash.
J. F. Orr, Idaho Power Co., Payette, Ida.
J. S. Simpson, Washington Water Power Co., Spokane, Wash.
D. F. Henderson, Washington Water Power Co., Spokane, Wash.
Capt. Norwood Brockett, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
C. P. Osborn, Portland Ry. Lt. & Pr. Co., Portland, Ore.
Lewis A. McArthur, Pacific Power & Light Co., Portland, Ore.
E. H. LeTourneau, Portland Ry. Lt. & Pr. Co., Portland, Ore.
L. T. Merwin, Northwestern Elec. Co., Portland, Ore.
C. M. Shinn, Cottage Grove Elec. Co., Cottage Grove, Ore.
A. C. McMicken, Portland Ry. Lt. & Pr. Co., Portland, Ore.
W. M. Hamilton, Portland Ry. Lt. & Pr. Co., Salem, Ore.
F. H. Gay, Vancouver, Wash.
W. M. Shepard, California-Oregon Power Co., San Francisco, Cal.
O. B. Coldwell, Portland Ry. Lt. & Pr. Co., Portland, Ore.
W. E. Heston, Portland Ry. Lt. & Pr. Co., Portland, Ore.
J. C. Henkle, Portland Ry. Lt. & Pr. Co., Portland, Ore.
J. D. Scott, Portland Ry. Lt. & Pr. Co., Portland, Ore.
J. P. Lottridge, Eastern Oregon Lt. & Pr. Co., Baker, Ore.
H. R. Wakeman, Portland Ry. Lt. & Pr. Co., Portland, Ore.
L. Lauvidson, Portland Ry. Lt. & Pr. Co., Portland, Ore.
P. J. Davidson, Pacific Pr. & Lt. Co., Portland, Ore.
H. T. Van Riper, Edison Elec. Appliance Co., Seattle, Wash.
Lewis A. Lewis, Washington Water Power Co., Spokane, Wash.
Edmund E. Walker, British Columbia Elec. Co., Vancouver, B. C.

W. A. Scott, Electrical Review, Seattle, Wash.
Col. E. Hoper, The Manufacturer & Industrial News Bureau, Salem, Ore.
H. B. Hudson, Stubbs Electric Co., Portland, Ore.
R. W. Clark, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
W. L. Walther, California-Oregon Pr. Co., Medford, Ore.
G. M. Myers, Pacific Pr. & Lt. Co., Portland, Ore.
R. M. Townsend, Portland Ry. Lt. & Pr. Co., Portland, Ore.
R. J. Moore, Y. E. Co., Newberg, Ore.
Lewis M. Shreve, Wenatchee Valley Gas & Elec. Co., Wenatchee, Wash.
Ray W. Turnbull, Edison Elec. Appliance Co., Seattle, Wash.
C. M. Brewer, Mountain States Pr. Co., Albany, Ore.
L. R. Grant, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
F. D. Nims, Washington Coast Utilities, Seattle, Wash.
F. B. Post, Grays Harbor Ry. & Lt. Co., Aberdeen, Wash.
F. G. Larkin, Seattle, Wash.
B. S. Manuel, Westinghouse Elec. & Mfg. Co., Mansfield, Ohio
E. V. Peterson, Westinghouse Elec. & Mfg. Co., Seattle, Wash.
W. Plank, Seattle Gen. Elec. Co., Seattle, Wash.
R. F. Monges, General Electric Co., Portland, Ore.
A. S. Moody, General Electric Co., Portland, Ore.
Chas. E. Canada, General Electric Co., Portland, Ore.
C. R. Wallis, General Electric Co., Seattle, Wash.
F. D. Barrett, Rathbone, Sard Co., Portland, Ore.
P. J. Kean, Pacific Pr. & Lt. Co., Portland, Ore.
R. M. Boykin, North Coast Pr. Co., Portland, Ore.
H. H. Schoolfield, Pacific Pr. & Lt. Co., Seattle, Wash.
P. A. Bertrand, Grays Harbor Ry. & Lt. Co., Aberdeen, Wash.
Chas. A. Sund, Tacoma, Wash.
E. S. Code, Westinghouse Elec. & Mfg. Co., Seattle, Wash.
G. R. Shuck, University of Washington, Seattle, Wash.
S. E. Gates, General Electric Co., Spokane, Wash.
T. E. Phipps, Seattle, Wash.
A. M. Chitty, Puget Sound Int. Ry. & Pr. Co., Everett, Wash.
P. J. Aaron, Fobes Supply Co., Seattle, Wash.
O. B. Gates, Hillsboro Pr. & Inv. Co., Hillsboro, Ore.
M. G. Cushing, Puget Sound Trac. Lt. & Pr. Co., Tacoma, Wash.
D. C. Barnes, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
John Harrisberger, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
John F. Farquhar, Washington Water Power Co., Spokane, Wash.
George Trippee, Westinghouse Elec. & Mfg. Co., Seattle, Wash.
J. C. McDougall, Westinghouse Elec. & Mfg. Co., Seattle, Wash.
J. A. Harper, Chelan Electric Co., Chelan, Wash.
Geo. E. Sullivan, Portland Ry. Lt. & Pr. Co., Oregon City, Ore.
A. H. Kreve, Portland Ry. Lt. & Pr. Co., Portland, Ore.
C. S. Knowles, Pacific Pr. & Lt. Co., Portland, Ore.
H. C. Schade, Portland Ry. Lt. & Pr. Co., Portland, Ore.
Robert Sibley, Editor Journal of Electricity, San Francisco, Cal.
W. S. Berry, Western Electric Co., San Francisco, Cal.
J. I. Colwell, Western Electric Co., Seattle, Wash.
F. J. Zorn, Pacific States Elec. Co., Seattle, Wash.
D. E. Harris, Pacific States Elec. Co., San Francisco, Cal.
E. F. Kirkpatrick, Pacific States Elec. Co., Seattle, Wash.
H. R. Noack, Pacific States Elec. Co., San Francisco, Cal.
P. H. Booth, Edison Elec. Appliance Co., Ontario, Cal.
P. L. Miles, Edison Elec. Appliance Co., Chicago, Ill.
Harry E. Dingle, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
W. R. School, North Coast Power Co., Chehalis, Wash.
C. P. Kinkaid, Northwest Elec. & Waterworks, Montesano, Wash.
E. M. Moore, Vashon Lt. & Pr. Co., Portage, Wash.
J. M. Kinkaid, Northwestern Pr. & Mfg. Co., Port Angeles, Wash.
E. B. Criddle, The Southern Sierras Pr. Co., Riverside, Cal.
Joseph E. Johnston, Journal of Electricity, San Francisco, Cal.
W. C. Henricks, H. Mueller Mfg. Co., San Francisco, Cal.
G. E. Quinan, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
R. E. Downie, Pole Co., Seattle, Wash.
Harry G. Anger, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
G. C. Pierce, Northwestern Elec. Co., Portland, Ore.
Stephen E. Dunn, Westinghouse Elec. & Mfg. Co., San Francisco, Cal.
H. E. Sullivan, Burton R. Stare Co., Seattle, Wash.
J. L. Wright, General Electric Co., Portland, Ore.
W. O. C. Sawyer, Pacific Pr. & Lt. Co., Yakima, Wash.
Roy Worth, Pacific States Elec. Co., Seattle, Wash.
R. G. Chamberlain, Hurley Machine Co., Seattle, Wash.
W. A. Marsden, Elec. Appliance Co., Seattle, Wash.
John H. Longfellow, Journal of Electricity, Seattle, Wash.
R. G. Barton, Pacific States Elec. Co., Seattle, Wash.
J. M. Laughlin, A. H. Cox & Co., Seattle, Wash.
E. A. Norton, Seattle Electrical Supply Co., Seattle, Wash.
John V. Strange, Pacific Pr. & Lt. Co., Portland, Ore.
C. O. Stewart, Seattle Elec. Washer Co., Seattle, Wash.
Geo. A. Boring, Pacific States Elec. Co., Portland, Ore.
E. V. Denton, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
N. H. Silver, Pacific States Elec. Co., Seattle, Wash.
A. Miller, Westinghouse Elec. & Mfg. Co., Seattle, Wash.
F. N. Cooley, Western Electric Co., Inc., Seattle, Wash.
M. T. Crawford, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
J. L. Casey, Westinghouse Elec. & Mfg. Co., Seattle, Wash.
W. P. Letson, Washington Coast Utilities, Arlington, Wash.
A. M. Catlet, Washington Coast Utilities, Edmonds, Wash.
F. D. Barrett, Rathbone, Sard Co., Portland, Ore.
C. A. Flint, Rathbone, Sard Co., Chicago, Ill.
C. F. Jaques, Rathbone, Sard Co., San Francisco, Cal.
R. M. Atkins, Kelso, Wash.
R. R. Easton, North Coast Power Co., Hillsboro, Ore.
S. M. Kennedy, Southern California Edison Co., Los Angeles, Cal.
B. M. Maddox, Mt. Whitney Pr. & Elec. Co., Visalia, Cal.
Geo. G. Bowen, Northwestern Elec. Co., Portland, Ore.
Edw. B. Cole, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
Fred F. Kerr, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
S. W. Heath, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
A. Emory Wishon, San Joaquin Lt. & Pr. Corp., Fresno, Cal.
Paul B. Munson, Westinghouse Elec. & Mfg. Co.
A. B. Drere, Grays Harbor Ry. & Lt. Co., Aberdeen, Wash.
Rome C. Saunders, Puget Sound Trac. Lt. & Pr. Co., Tacoma, Wash.
H. K. Munroe, Puget Sound Trac. Lt. & Pr. Co., Tacoma, Wash.
G. F. Harris, Portland, Ore.
C. Hugo Meson, Aberdeen, Wash.
B. L. Kerns, Westinghouse Elec. & Mfg. Co., Seattle, Wash.
P. O. Crawford, California-Oregon Power Co., San Francisco, Cal.
C. F. Terrell, Puget Sound Trac. Lt. & Pr. Co., Seattle, Wash.
C. D. Cunningham, Globe Elec. Co., Seattle, Wash.
O. P. Cull, Washington Coast Utilities Co., Seattle, Wash.

Public War Experiences and Their Effect on the Future

BY W. H. McGRATH

(By far the most valuable paper of the recent Northwest Electric Light and Power Association Convention is here reproduced in full. The paper deals with the most vital problem before the industry today, namely, the necessity of an awakened public consciousness to the needs and aspirations of the public utility. The author is vice-president of the Puget Sound Traction Light & Power Company.—The Editor.)

The world war of 1914 to 1918 was the most stupendous catastrophe in the history of civilization. Its effect, while it lasted, on the nations involved and its effect for generations to come will be felt on social, business and economic life of all our people. Almost all human relations, individual, national and international, have been disturbed and readjusted on account of the war and it seems to be that we ought, at this time, to look at the effect upon our industry during the past few years and the probable effect in the years to come, in a broad way without going too deeply at this moment into the detail considerations affecting any particular utility or class of utilities.

Public Utilities in War Time

Some extremely interesting developments have taken place on this coast during the period of the war. Utilities which had been suffering from disastrous competition laid aside for the moment the effort to secure new business and discontinued practices that involved a waste of labor and material, since both were needed by the nation as a whole. Corporations connected up their systems with high tension transmission lines and made the surplus capacity of one available to several, with the same object of conservation in view. This was particularly true on our Western coast in the state of California. All kinds of operating costs mounted excessively and are still going up and in many cases new problems in the handling of labor had to be disposed of. Collective bargaining and the practice of dealing with employes through authorized representatives, with the right of appeal of decisions to the National War Labor Board, entered into our business lives for the first time. We felt, along with other industries, the sharp effect of volunteer enlistments and draft for the nation's armies on the personnel of our companies, and sometimes were hard put to it to fill the vacancies with acceptable men. We put women in the places of enlisted men in many cases and I think that most of us were rather surprised at the way the women took hold of the work and often did it quite as well as the men they displaced.

We found it necessary to go to larger expenses in guarding our properties against the public enemy, who by underhanded methods might seek to destroy the service to communities and cripple the war industries dependent on this service.

We were impressed anew with the classification of our business as a vitally "essential" industry in the meaning of the war department which determined what classes of business should not be interfered with in the operation of the draft.

All these and many more "experiences" fell to each of us during this period and each property, in its own general policy, disposed of them. But little good can be accomplished by recounting specific ex-

periences now and after all it seems as if the period after the war, and not during the war, is producing the greatest strain on our utilities, because of the non-elastic character of our business and the prejudice of ignorance of the people at large with regard to the fundamental economic laws which govern it.

Educating the Public

I feel quite keenly that the public service business needs a national treatment. Of course we must recognize that the laws of the states, under which our companies are incorporated, and the franchises and ordinances of the cities and communities in which we do business, determine in many cases the conditions under which our public service properties must be operated and the procedure necessary to follow in order to secure changes of rates or of service, the approval of securities, etc., but when I say that the problems of our industry are a national matter I mean that the problem of establishing in the minds of all of the people the fundamental basic economic facts, which in the end determine the possibilities of fair rates and adequate service for the people, is a national problem. From the very nature of it it cannot be local. Every public utility at one time or another has attempted to tell the people of the community that it serves, the truth about its business. This has been done in many cases by newspaper publicity (which is always discounted because the reader is a patron of the utility and sees a selfish motive in the argument); by personal addresses of the executives, which after all reach only a small proportion of the public and in most cases are heard only by two classes of people—those who know that the statements are correct but are more or less indifferent and do not do anything about it, and those who are inherently hostile, often for selfish reasons involving their own political or pecuniary advancement—and in other more or less spasmodic and ill-timed attempts.

Two great popular modes of educating the public, as it is called, seem to me not to have received the attention they deserve. One of these is the moving picture theater and the other is the popular magazine. Of the two, it is my personal opinion that the second holds forth the greatest promise for the best results, but it goes without saying that no such magazine as the Saturday Evening Post, for instance, which is read by millions of readers every week, can treat either editorially or by way of analytical article or story, of the problems of any particular utility. We could only hope that by continued, intelligently applied effort of the best available brains, the mass of the people could finally be made to understand the basic economic principles which must govern the operation of a regulated public service business. It is a tremendous undertaking to attempt to make the

people of America see clearly and think clearly on such matters. It is going to take a long time to get them to take the trouble to do this, but the people of America make our laws, establish the conditions under which our regulatory bodies act and in the last analysis determine by their state of mind the ultimate success or failure of the private operation of our industry.

The most lamentable ignorance of the fundamental laws of economics is seen every day in discussing on the street and in the home and in the daily press the "High Cost of Living" and its causes as the result of the world war. Here is a subject that every individual is interested in and it is not surprising, of course, that people do not understand all about it because nobody understands all about it, but the vast majority of the people do not understand anything about it. How, then, can we expect them to understand the fundamental facts determining the cost of establishment of properties, operating expenses, maintenance and depreciation; how and why a company is financed; what the man who puts his money into a privately owned utility is certain to expect; the effect of short term franchises, taxes and other burdens upon rates; the necessity for establishing and maintaining adequate surpluses to take care of contingencies; the reasons why profit sharing with employes would be gladly adopted by many companies provided there were any real profits in the business to share and provided the employes would share losses as well; and all the other matters which Mr. American Citizen ought to understand if, under democratic government, we are going to secure simple justice.

Public Utility Finances

All public utilities (and this includes steam railroads) require immense investments in proportion to their gross earnings, as compared with other ordinary lines of private business. In order to secure a continuance of fresh capital, which is always needed for the normal growth and expansion of our properties, not only should the investor, who has put his money into the enterprise already, be assured of an interest return and of ultimately getting his capital back, but the man who today and next year is going to be asked to put new money into the enterprise, must be doubly reassured in the light of the past couple of years' experience, or else he simply is not going to put his money into the property, and extensions to the service of the utilities under private ownership will cease.

Practically all of our states have Public Service Commissions and the public service business is subject to continuing regulation. No large profits can ever be earned for a long period of time and an absolutely necessary corollary to the fact that the margin of earnings must always be small, is that this margin must always be definitely assured. This is not a theory; it is a fact and a stubborn fact. Up to the point of confiscation, where we fall under the protection of the Constitution of the United States, the earnings and therefore the property of a utility, by undue burdens in the shape of taxes or other charges of a public nature, greatly increased operating expenses due to the demands of labor, or too low rates

due to the inability or the lack of inclination on the part of regulatory bodies to make the rates adequate, may be made to suffer—and the present plight of the street railways all over the United States, which are falling into the hands of receivers one after another, is a good illustration of the lack of flexibility in our business to take care of the changes in economic conditions brought about by the war. It may be that many of these properties cannot be saved; that the savings of hundreds of thousands of men, women and children invested in the securities of these properties may be lost or at least depreciated in value. We may even go so far as this, but no power under the sun can compel any man to put more money into such a business proposition unless he wants to do it.

The continuance, then, of successful private ownership and operation of utilities serving the public, is absolutely dependent upon a clearer understanding on the part of the public of our problems. If the public cannot, by whatever means is adopted or by all means together, be made to see these problems and to act intelligently in the solution of them, the only other possible answer, if the public is to get public service, is governmental and municipal ownership with whatever of good or of evil that may produce.

The particular business of the members of this Association is that of furnishing light and power. Unlike most other businesses which have undergone the stresses of the war period, we cannot at will shut down our plants when it pleases, and in many cases we cannot even decide as to whether we would like to expand our business or not. We have undertaken a legal obligation to serve the public and we have undertaken the obligation to raise the funds necessary; this can be done if conditions are right and it simply cannot be done if conditions are not right. One would sometimes think that it was criminal for a public utility to be prosperous. As a matter of fact, from the standpoint of everybody concerned—the public served as well as the owners of the property—this is the most desirable condition. If it isn't prosperous, not alone will the holders of securities suffer but the employes must suffer, due to failure to secure the wages they ought to get; the community will suffer on account of poorer service and failure to secure adequate extensions of service. If in prosperous years a utility is allowed to accumulate a surplus which will be adequate to take care of periods of stress, it might be possible to weather a temporary condition of loss of earnings, and this is one of the best arguments why utilities should accumulate and should be allowed to accumulate a reasonable surplus.

In our particular business—I am speaking now of the light and power business—it is clearly evident that our rate system is not flexible enough to take care of such violent changes in conditions as have taken place in the last couple of years. Companies ought to establish and commissions ought to approve a more flexible system of rates which would take care of changes in conditions almost automatically.

The present procedure of securing approvals of increases in rates from many Public Service Commissions is too cumbersome and consumes too much

time. No great harm can result to anybody from having a more flexible system of rates, which would automatically take care of changes in conditions such as abnormal increases in operating expenses due to meeting the necessary demands of labor, which is struggling to cope with the high cost of living. Suppose the properties do, for an interval, secure a little more or less by a flexible system of rates, than the fair return on the fair value of our properties devoted to public service, which is assured to us. Provided it is in the business, what harm does that do under continuing regulation? If we accumulate a little greater surplus, more or less, it would simply act as a cushion to prevent more violent changes in rates or in service or both, and may very well influence the cost of raising money, which is just as much a cost to be paid for by the consumer of our service as is the cost of buying coal or of buying labor. In the last analysis the consumer of our service is supposed to pay the full costs anyway and certainly the cost of money is an absolutely vital factor in the total cost;—and right here I want to impress upon the members of this Association that they make their own official bodies in their communities understand that high cost money simply increases the cost of service.

We are right now in a period where construction costs are from 80 to 100 per cent higher on the average than they were five years ago. These figures are the result of careful analysis made by our engineers. It is also a fact that, as many of you will find who have to raise new money, that the cost of money has tremendously increased since the beginning of the world war. This is perfectly natural. On the one hand there has been a tremendous destruction of property and of lives which would have produced property, and on the other hand has been the issue and distribution by all of the governments involved in the war of billions and billions of dollars of government bonds or promises to pay. The amount issued by six of the larger governments alone for purely war purposes is stated in a recent article on the subject to be more than twelve times the total amount of gold and silver mined since the beginning of the world. With such a market for money, not to speak of the innumerable domestic and foreign private opportunities opened since the close of the war, is it any wonder that the investor can get a higher rate for the use of his capital than he has been getting in the past? If you will take just these two items alone—the cost of construction and the cost of money—and apply them to any new element of development in your business you will find that the fixed charges or the carrying cost of any expansion at this time will be from three to four times as much as it was five years ago. Not only must we secure moderately higher rates to take care of increasing operating expenses of existing plants, but we must secure tremendously higher rates to take care of new business loaded on new plants, if we are going to come out anywhere near even.

Each company, large or small, in this Association has had its own peculiar problems brought about by the war and in many cases still unsettled. Prob-

lems of physical operation due to difficulties of obtaining men and supplies; problems of construction due to the sudden imposition of unexpected load conditions to care for war industries; problems of a legal, accounting or commercial nature due to the sudden changes and tremendous activities of an essential industry under the stress of a national emergency. On the whole I think it safe to say that no body of citizens or organized industrial undertaking performed its full duty to the nation more patriotically and whole-heartedly than the public utilities and none with less government help or guarantees against loss. And the individuals associated with our companies have in full measure given of their service to the nation when called upon, either for military duty or the many allied activities of civilian life, which were essential to the proper conduct of the war.

The peculiar problems of the individual companies will be disposed of by those companies, but out of all the confusion and turmoil and trouble of war time experiences these conclusions of overwhelming importance remain with me: (1) The ordinary American citizen does not understand the basic fundamental economic facts which absolutely control the destinies of our utility corporations, and if private ownership is to continue and be successful, he must be made to understand them. And, (2) this can only be done in a national way and applied to our whole industry rather than to individual properties and it must be done by the use of every vehicle of popular presentation available, especially the popular magazine and the moving picture theaters.

I recommend that your Association appoint a special committee instructed to take the initial steps in securing such a national effort by the public service industry as a whole. It will cost a very great deal of money, but it will be worth it.

This general outlook on the whole situation may be criticized as pessimistic. It is pessimistic, but I would not have anybody consider that I believed it to be hopeless.

I expect no substantial disagreement from the members of this Association with the statements of conditions outlined in this paper, but the one point of immediate practical importance is that something has got to be done about it and we might as well start it and start it now.

Why not place the Resources of the Public Library at the command of your Business?

The special service which the public library offers the business man and how you can make the most of it will be pointed out in a series of articles by the leading librarians of the country, commencing in November.

The Point of View

BY S. M. KENNEDY

(What are the factors which really determine the attitude of the customer towards the public utility, and how far is the individual employe responsible for the good-will and confidence inspired by the firm? This is the first of a series of articles by the general agent of the Southern California Edison Company on the personal element in public utility practice.—The Editor.)

There are very few people of whom it may be said "eyes have they but they see not." Almost everyone with eyes sees, but some see more than others, or perhaps it would be better to say that some are more impressionable than others. The impression made upon an individual about any person or thing usually has lasting results, and fixes his point of view. Not long ago a large consumer of a Pacific Coast company called on one of the officers of the company to talk over some important business.



A well kept substation. The customer's first impressions are very important to the company.

In the course of the conversation the consumer remarked, "Mr. Blank, I have come to you, because to me you are the power company." Of course that officer immediately took a mental inventory of his words and actions, to discover if he were making a noise like a hundred million dollar corporation. It is a fact that that same remark applies to every one connected with a utility company, and for that reason each employe should have due regard as to his appearance, and be concerned about the impression he makes, so that the public may always be imbued with the fact that his particular company stands for what is best in, and for, each community in which it operates.

How the Public Judges

Now, an electric utility company may be large or small—may operate over an extended area or in a limited field, yet in each case the importance of appearances is relatively the same. Sometimes in the West, it happens that companies grow with leaps and bounds, and even their employes cannot keep up with their rapid expansion. However, the individual customers of a utility company are not familiar with the immensity of a corporation's interests. As a rule, they are familiar only with that part of the company's property which is in their immediate vicinity. Here again one faces practically

the same condition relative to the company's properties as has already been referred to relative to the company's employes; that is, the buildings and property in any territory represent to the people in that territory the utility company to which they belong. These people may hear of the great water power plants which the company may have in other counties; they may hear of long distance transmission lines built of steel towers and possessed by the company elsewhere; they may hear of million dollar steam plants or handsome buildings in adjacent cities, but, as a rule, they are not familiar with the details. All they know of their own knowledge about the company is what they see in their own neighborhood. Consequently the buildings, offices and property of the utility company in their immediate vicinity stand for the whole company.



Arrangement and appearance of a typical district office in the Southern California Edison system. The open office suggests a frank friendliness between company and customer.

The sage Polonius, in his advice to his son, among other things said:

"Costly thy habit as thy purse can buy,
But not expressed in fancy,
Rich, not gaudy, for the apparel
Oft proclaims the man."

It is not within the scope of this article to go into exact details regarding an employe's personal apparel. A definite statement cannot be made as to whether an employe should wear black or tan shoes, what color in neckties is best suited for certain ages and occasions, and when and where riotous socks may be permissible. But it is well to note the last words of the foregoing quotation—"For the apparel oft proclaims the man." From the point of view of the customer, an employe's appearance is important to the company. If the employe be unkempt looking, if he needs a shave, if his collar is soiled, his clothes

spotted, and his shoes unbrushed, he certainly cannot make a good impression upon the customer—and yet to the customer, that employe represents the company. A corporation is only an aggregation of men, and the faults and failings of the individual apply to and are charged against the company. It is therefore apparent that company managers should see to it that such employes as come in contact with the public are clean and tidy in their apparel, and present a creditable appearance.

Impressing the Customer

Now, let us turn to the company's properties, and study the effect of their appearance upon the public in general and upon the company's interests in



A corner in the show room attached to a district office. A pleasant atmosphere does much to build good-will.

particular. Let us measure the advantages if these properties are well maintained, and estimate the disadvantages if the properties are neglected. Let us look at an electric property, where the transmission and distribution lines have been carefully planned and admirably maintained. They do not need any lengthy explanation as to why they are this or that way. Such lines speak for themselves, and what they say is highly creditable to the company and the company's engineers. If we step into the stations and sub-stations of the ideal company, as a rule we see equipments that can be recognized as standard in their make, and modern in their methods of installation. In looking at the surroundings within the stations, we find that everything is neat, and tidy and ship-shape. It is a good plan for a company manager to ask himself and his assistants, "Are our lines maintained as they should be? Are the external and internal appearances of our stations and sub-stations as clean and presentable as they might be? Are the offices, warehouses, storerooms and garages kept in a manner which will impress the visitor with the thorough up-to-dateness of the company, and give him a full appreciation of the value of its property, and the importance of its position in the community?" If the manager will regularly go over and inspect the properties under his care, he will learn in what respects his management may be weak, and

in what directions the properties may be making decidedly bad impressions by their outward appearances, visible to the public eye. If he scrutinizes closely in some directions he may even note the signs of coming degeneration. Perhaps the causes pointing to the seeming degenerate condition may indicate that his assistants have gotten into a rut, and they do not see what is going on around them. Ruts such as these are very dangerous, and should be as carefully shunned as a wasting disease.

How Not to Do It

Concerning the internal and external appearances of a company's offices and buildings—the subject should be looked at from two standpoints: (1) cleanliness, and (2) tidiness. It is well to understand thoroughly the difference between these two words. A building may be absolutely clean from top to bottom, and yet be uninviting because of its untidiness. How often it happens that the office of a utility company is really unattractive and yet those who work in the office either do not see it, or do not care about its condition! Windows fly-marked, floors dirty, counters and shelving dusty, and ceilings ornamented with cobwebs. In addition to this, the appearances of the appliances on exhibition are often of such a character that prospective customers would need to be hard pressed before they could be induced to purchase. The counters inside the office are often littered with torn papers, ragged books, burned-out lamps, disabled appliances, broken pencils, superannuated pens, empty ink wells, and other materials and rubbish scattered in disheartening confusion. If the office is sometimes in a bad way, the store room is frequently worse, and in some instances almost borders on chaos. At some locations supplies are not kept in anything like proper order. They appear to be unpacked and thrown about in a manner regardless of any idea of regularity, and no attempt made toward accessibility and condensation of space. It would seem to be an impossibility, where stores are kept under such conditions, for anyone to have a proper knowledge of what is in stock. It must also mean an endless waste of time, in walking around piles of goods, and taking needless steps in going from one part of a room to another. It is fair to state that conditions such as these are not general—at the same time it will be noted they still exist in too many places.

The Psychology of Environment

Now, let us look at the effects of dirtiness and untidiness. In the first place, what effect has it upon the company's employes, if such conditions are allowed to continue? A constant condition of dirt on the floor will eventually produce clouded thoughts; dust on the furniture and fixtures will surely result in a blurred vision; and cobwebs on the ceiling will lead to cobwebs in the brain. A manager may well ask himself candidly, "How can a man work his mind and body to the best advantage under such conditions?"

The reverse, in the way of cleanliness and tidiness, means brightness, acceleration in work, and a cheerfulness which will permeate not only among

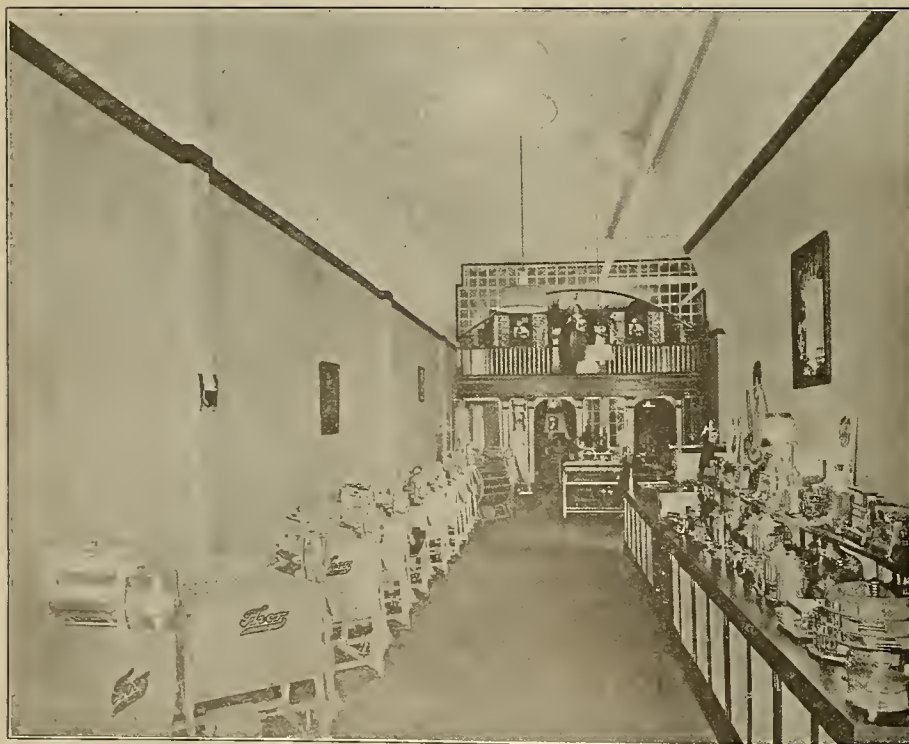
those in the office, but will spread outside far beyond the confines of the building. It will also mean that results will be accomplished much more quickly, as there will be less time wasted in finding things which should not be lost, and in transferring misplaced articles from where they should not be to where they belong.

The Hospitable Office

Next, what is the effect upon the company's customers? If a customer enters an office which is not clean nor tidy, is he going to remain there any longer than is absolutely necessary to transact his business? Will he stay to tell anyone how much pleased he is with his electric service, and will he browse around to leave himself open for suggestions as to what additional electrical appliances he could advantageously use in his store or residence? When he goes home, will he carry with him a good impression to tell his wife and family? The answer is, "No!" The appearance of such an office will work against the company's interests. On the other hand, if a customer goes into an office that is bright, clean and inviting, he will be in a better mood to remain and make inquiries. He will take his time to look around, and listen to what may be said concerning the utility of certain current consuming devices. Maybe, if the show-room looks attractive, he will stop to inquire about some of the exhibits which are new to him, and such inquiries, as a rule, eventually lead to sales. When he goes home, he will tell his wife and possibly his neighbors about the things which aroused his interest, and suggest that they, too, drop into the office and look them over.

There is one other phase of this question of appearances, as far as a utility company is concerned,

which is not always appreciated by its employes. A large amount of the money put into the development of the company's business comes from outside sources. Bankers and others at home or abroad, who are investing in the company's securities, are always interested in the management and operation of the business, and sometimes they have ways and means of finding out matters in connection with what is being done, and left undone, which are supplementary to the reports and statements issued through the executive offices of the company. A manager never knows when a representative of some of these moneyed people, who purchase and sell his company's securities, may be looking over the property—may be examining transmission and distribution systems; may be peeping into electric stations, or dropping into an office to make inquiries about rates and local conditions—and all the time he may have the appearance of some unsuspecting visitor considering the question of locating in the city. Perhaps the manager would be surprised if he saw some of the reports that these unsuspicious looking strangers send back to the holders of the company's securities. It requires no stretch of imagination for a public utility manager to understand that his business is constantly under the closest scrutiny. He and his assistants are the custodians of the property and they have no more essential work than that of conserving the company's interests by maintaining everything in good condition and giving due regard to appearances. Such care will make the desired impression upon the employe, the consumer and the investor, and give to each of them a proper idea of the company's standing and importance from their particular Point of View.



The Electric Appliance Company of Seattle is an exclusive electrical merchandise store, selling all standard types of electric washing and wringing machines, vacuum cleaners, heating devices, ranges, Duplexalites and Edison Mazda lamps. Merchandise is sold on the easy installment plan; no wiring contracting or repair work is taken; personal solicitation, backed up by strong advertising and circular work, brings in the business for the firm.

The display room is twenty by sixty-five feet with two nicely furnished display rooms for Duplexalite and heating devices at the rear. Behind this is a room twenty feet square for the use of solicitors, where they keep their prospect records and have undisturbed use of a telephone.

Building a Sales Department

(In general it is safe to say that to the public the salesman is the company, and on the salesman, therefore, falls much of the responsibility of building and maintaining the company's reputation. Here are some of the methods employed by a large company in producing salesmen with the thorough knowledge and long training necessary to their position.—The Editor.)

The importance of the salesman may be appreciated when it is realized that to the customer in most cases he is the company. If this is true of the retail establishment, how much more it applies to the jobber or manufacturer whose only representation in the small town or country district often lies in the salesman's occasional visit.

Growing Your Own —

The San Francisco branch of the Western Electric Company has recognized this necessity of an all-round knowledge of the company's scope and spirit, as well as an intimate familiarity with company

must be obtained later within the establishment if not possessed originally. The main factory of the Western Electric Company at Hawthorn conducts a school for promising college graduates who then find their place in different lines of the company's work. Some of these are sent out to branch houses and some find places in the sales department, but not many. Western business is of necessity carried out along somewhat different lines than eastern and the best material for salesmen is obtained from within the branch itself.

The Course of an Education —

Anyone who is a salesman by nature and who discloses himself in whatever line of work he be, may be captured by the sales department, but the usual avenue of approach is through the stock room. Here the man has a chance to learn the extent and character of the stock and to follow the filling of orders as they come in from the field. From here the natural sequence is either to office work or to city work, or through the office to the city salesman's position. The city sales positions offer the opportunity of close contact with the home office and frequent consultations with those in charge. Problems which arise may be talked over, questions asked and difficulties straightened out. To some extent the ancient order of things is reversed and the city presents an excellent training field for the country.

It takes five or six years to grow a sales force from the material of an organization, and each salesman represents the product of that period of training. Once developed in this well rooted fashion, however, it forms a healthy unit of some permanence ready to meet emergencies as they arise and to grow with the organization.

The Salesman's Responsibility —

As the representative of the company to the customer, the salesman must first of all understand the materials he is selling, and not only the particular items he may have on his list, but any branch of electrical ware or its operation on which the customer may ask questions. In consequence, he is encouraged to study his product, to read technical articles—and to take his subject home to master it. Suggestions are continually being sent out from the home office on new devices with which the salesman is expected to be familiar, and several subscriptions to technical magazines are maintained so that greater use may be made of these reference books of up-to-the-hour progress.

The salesman must be a specialist on merchandising methods, as well. The company in its position as a manufacturer spends a vast amount of money on dealers' helps—but it is largely the province of the salesman to see that the value of these is really understood and that they are put to use. Each salesman carries with him a cloth bound case containing

Western Electric Company
APPLICATION FOR EMPLOYMENT

COMPLETE NAME _____ DATE _____
ADDRESS _____ CITY OR TOWN _____ TELEPHONE NO. _____
PLACE OF BIRTH _____ DATE OF BIRTH _____ (MONTH, DAY AND YEAR) _____ NATIONALITY _____ MARRIED _____
NAME OF GRACE SCHOOL _____ FROM _____ TO _____ DID YOU GRADUATE? _____
NAME OF HIGH SCHOOL _____ FROM _____ TO _____ DID YOU GRADUATE? _____
OTHER EDUCATION OR TRAINING _____

KIND OF WORK WANTED _____ AMOUNT OF WAGES OR SALARY EXPECTED _____
HAVE YOU ANY PHYSICAL DEFECTS? _____ FORMER EMPLOYERS (SHOW CONSECUTIVE PERIODS)
GIVE THE NAME OF THE FIRM YOU LAST WORKED FOR _____
LAST EMPLOYER _____ DID YOU LEAVE? _____ DATE OF LEAVING _____
C. NAME _____
(STREET & NUMBER) (TOWN) _____
WHY DID YOU LEAVE? _____
NEXT PREVIOUS EMPLOYER _____
D. NAME _____
(STREET & NUMBER) (TOWN) _____
WHY DID YOU LEAVE? _____
NEXT PREVIOUS EMPLOYER _____
E. NAME _____
(STREET & NUMBER) (TOWN) _____
WHY DID YOU LEAVE? _____
NEXT PREVIOUS EMPLOYER _____
F. NAME _____
(STREET & NUMBER) (TOWN) _____
WHY DID YOU LEAVE? _____

HAVE YOU EVER BEEN EMPLOYED BY THE WESTERN ELECTRIC COMPANY? IF SO, WHEN? _____
HAVE YOU ANY RELATIVES IN THE EMPLOY OF THIS COMPANY? IF SO, GIVE NAMES _____
INTRODUCED TO THIS COMPANY BY _____
HAVE YOU EVER BEEN EMPLOYED BY ANY TELEPHONE COMPANY? _____
IF SO GIVE ITS NAME AND ADDRESS _____
DATE OF ENTERING ITS SERVICE _____ DATE OF LEAVING ITS SERVICE _____

REFERENCES (DO NOT REFER TO RELATIVES)
NAME _____ ADDRESS _____ BUSINESS _____
NAME _____ ADDRESS _____ BUSINESS _____
NAME _____ ADDRESS _____ BUSINESS _____

(IMPORTANT)—READ RULES ON OTHER SIDE

THE EMPLOYMENT APPLICATION BLANK

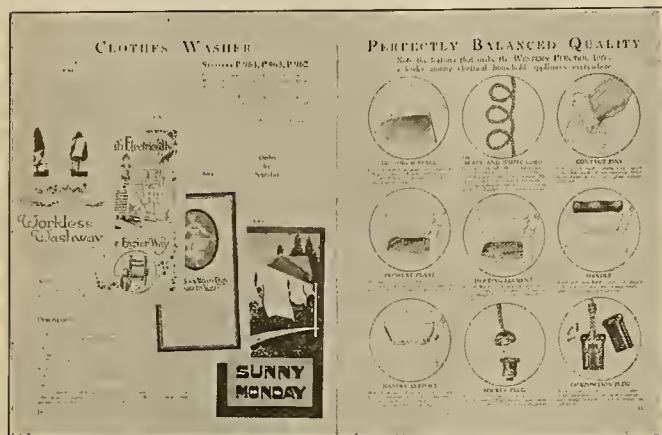
Of course there are new members taken on the staff of the company from time to time—but very few of these in the sales department. Not only is the sales organization, if a good one, a fairly permanent institution, but when vacancies occur they are usually filled from the ranks of other departments.

lines by developing its sales department in large measure from the enterprise of its other departments.

The Western Electric Company is already famous for growing high executives from office boys. Aside from the business health indicated by the ability to produce leadership from within an organization, the executive or the salesman thus produced will have a knowledge of his concern not to be obtained by any outsider in a few short months of intensive study.

In selecting material for salesmen, it is preferred to start with men who have some technical training, for it is an axiom that a man cannot sell anything he does not understand—and the technical knowledge

samples of booklets, cards, and newspaper cuts which the company is prepared to furnish; he knows such moving picture films as the company provides, and when they are to appear in the local theaters of his district, or on what occasions they might be used to profit by the dealer himself. The salesman can carry ideas from one merchant to another and it is he who is looked to in large measure to bring the appreciation of such progressive improvements as the standardized accounting system to the small dealer who is out of touch with his fellows. The new



DEALERS' SALES HELPS

The salesman not only sells goods to the dealer, but helps the dealer to re-sell them to his customers. The two pages here shown are samples from the "Electric Appliance Sales Promotion Service" which is in the hands of the dealer and which the salesman carries always with him. Here are listed newspaper cuts available, envelope stuffers and car cards which are to be had for the asking, and advance notices of the moving picture and other material which the Western Electric Company makes available.

interest which the newspaper is taking in the electrical industry is helped by the personal call of the electrical salesman as he passes through the town.

Keeping the Field in Touch —

In order that the salesman may thus be the missionary of the electrical industry in general and of his company in particular, it is necessary that he be kept informed of new articles, price changes, new advertising policies and the like as they arise. The Western Electric Company has developed a system of specialists who are responsible for sales in their respective lines and in consequence whose responsibility extends to keeping the force in the field in touch with the resources at their command.

This is accomplished through circular letters and through a weekly publication, the "Weekly News Letter," which is circulated regularly throughout the sales force. This is edited in the San Francisco office and must contain at least one contribution from each of the specialists—a suggestion, for instance, as to a new field for some telephone apparatus, a change in price in high tension material, a sales record made in some district in lamps, a new household labor-saving device which is to be added to the line.

Bi-weekly conferences of the heads of departments keep all work coordinated and give an opportunity for the threshing out of problems. These are wholly informal in their nature for the consideration of whatever matters come up in the two weeks period. More formal gatherings are held twice a year at which programmed papers are given and which all salesmen attend. These take much the

same place in the intimate life of the company organization that the convention fills for the industry as a whole as a factor of personal intercourse and the valuable exchange of ideas.



A WESTERN ELECTRIC SALES CONFERENCE

Sales conferences bring out new ideas and keep the sales force in up-to-the-minute touch with the lines they represent.

For the sales force is a living thing, planted with care, trained and cultivated and kept at the pitch of its utmost productiveness only by constant thought and vigilance. There are no rules to govern its development—rather principles and the meeting of each emergency as it arises with a trained judgment.



The Journal of Electricity, in its issue of August 1, published for the frontispiece a picture of the scene of operations at the North Portal of the new Kerckhoff Power Plant of the San Joaquin Light & Power Corporation on the San Joaquin river near Fresno, California. Here is another photograph of the same scene of operations taken less than two months later, and showing the remarkable progress that is being made on this big hydroelectric development. In the center lower foreground is the first completed concrete section of the dam.

The Force Behind the Sales Force

BY AUBREY DRURY

(To energize its outside salesmen, the Electric Appliance Company of San Francisco has perfected an "efficiency chart" device which is described in this article. It will be seen herein that there are many other ways in which the progressive jobbing concern can add to the success and effectiveness of its sales agents.—The Editor.)

INGENIOUS methods of adding to the energy and efficiency of its outside salesmen have been put into practice by the Electric Appliance Company, one of the largest and most progressive jobbing concerns on the Pacific Coast. In sending out a score of salesmen, the company employs a system of checking the effectiveness of their work which has proved of immense advantage both to the men themselves and to the central organization.

Before the salesman goes out, a close study is made of the territory he is to cover, and the opportunities it offers as a market for electrical appliances. The records in the office as to previous sales in this territory are taken into consideration, together with the current condition of the stocks carried by dealers. After all these things have been gone into thoroughly, the amount of electrical ware that the salesman "ought to sell" each month in his district is definitely determined. A conservative figure for each appliance is fixed—for instance, a man on the road may be expected each month to place orders in his district for at least 50 washing machines, 250 electric irons, 20 electric ranges, and so on. These figures constitute the permanent "targets" at which the salesman is expected to aim. His efficiency in each line is judged by the percentage his actual sales form of the "target" figure. The quality of his marksmanship becomes apparent.

Charting the Campaign —

Using such a percentage system, the progress of the sales campaign is charted in the San Francisco office. Each salesman is required to send in regular reports of his work, stating the number of each article sold. On a large sheet, containing the names of the different salesmen, an accurate record is compiled of their sales for the month. At the top of the sheet, as the headings for columns, are listed twenty or twenty-five electrical appliances—both specialties and standard stock which it is desired to move—and under these are placed the number of sales normally expected of each salesman, the actual sales made by him, and the percentage these latter form of the expected number.

The percentage figure thus represents the efficiency of the agent in each line. Near the outer margin of the sheet is a summation of the whole. The average efficiency percentage of the salesman is

determined by dividing the sum of the percentages in the individual lines by the number of lines listed.

In practice, this table of sales proves most illuminating. At a glance can be seen just how well the sales force is coming up to expectations of the central office in the various lines, and the final efficiency percentages are very important, for they offer a good index of the enterprise and energy of each salesman. The final standings, let us suppose, may read 86%, 47%, 25%, 39%, 67% and so on. It is safe to say that the salesman who makes a low showing will be

urged to more strenuous endeavors, in a letter from the sales manager, and the "high man" is likely to be congratulated upon his leadership of the field. Sometimes the table shows that a salesman made absolutely no sales of a certain appliance, and he is forthwith advised to devote more attention to placing that article, since the Electric Appliance Company aims to have its representatives all-around men, neglecting no department of the sales field.

The Blueprint Sales Table —

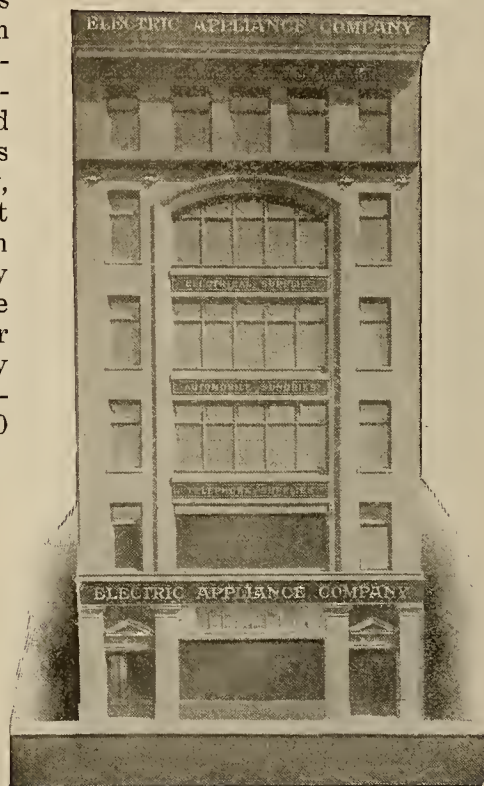
Every month a blueprint copy of the statistical table showing the efficiency of the outside force is sent to the salesmen. In this way, each one is kept in touch with the work of the others, and knows the general trend of the trade.

"The whole system, as developed in our office, has proved of decided benefit to the efficiency of the organization," declares C. C. Hillis, vice-president and treasurer of the Electric Appliance Company. "Its best point is that

it spurs slow-sellers to more action, and gives the most energetic that feeling of satisfaction in work well done which is one of the highest rewards in industry and business. Much credit for the evolution of 'the efficiency chart plan' is due to Mr. F. J. Cram, our secretary and sales manager, who is at all times in close touch with his selling force."

Handling Two Main Lines with Economy —

As a matter of fact, two sets of blueprints are sent out—one covering sales of electrical appliances and the other covering automobile supplies—for the company has for the past six years successfully handled both lines. The salesmen, except those in the city of San Francisco (where different men exploit the distinct lines), sell electrical ware and automobile sundries throughout their territory, and are expected



The Electric Appliance Company occupies an entire building in San Francisco's wholesale district. Note the display signs and the ample show window.

to devote equal attention to both. When the auto line was added, some of the agents, who had devoted themselves exclusively to the selling of electrical goods, were slow in "taking hold" of the new opportunities, but now Mr. Cram pronounces them all specialists in both lines. "In this way," he says, "it is found possible to 'make' territory which we otherwise could perhaps not afford to cover, and the entire arrangement proves most economical." Albert Meinema is manager of the Automobile Department of the concern.

Included in the wide extent of territory covered by the salesmen are California, Nevada, Arizona and southern Oregon.

The two main lines—electrical and automobile—are kept absolutely distinct. The company believes that each line must be protected in its own field, and therefore is obliged to decline quoting prices on one line to those in the other. If an automobile dealer, for instance, through the advertising of the company becomes interested in an electric washing machine, he is advised to visit the nearest electrical dealer for a demonstration.

Advertising from the Jobber's Standpoint —

The efforts of the salesmen are supported with well-planned and well-placed advertising. For new specialties, preparation of the field is made in a mail campaign; and mail solicitation is employed also in covering out-of-the-way territory. Thousands of the advertising leaflets published by appliance manufacturers are distributed each year, and the suggestions of the manufacturers as to methods of publicity for their lines are usually followed. Display advertising is carried in the Journal of Electricity and other technical papers.

"Newspaper advertising," comments Mr. Hillis, "appears to be the particular province of the manufacturers and the dealers, unless the jobbers have exclusive lines. Nevertheless, the jobbers are glad always to cooperate with others for the general up-building of the industry, and the proposal for securing special pages and sections of the newspapers, devoted to electrical development, should receive their support also. To my mind the electrical section ought to excite more interest than the automobile section; it deals with necessities, not luxuries, and is of vital consequence to every housewife, and to every man concerned with industry. The people are hungry for electrical appliances; they present the one solution to the servant problem."

An Electrical Trade House Organ —

To further the efforts of its salesmen, the company issues a monthly house organ, "Electrical Trade," distributed free to all customers. This interesting magazine features articles dealing with electrical affairs, announces new specialties as they appear, and advertises the various lines carried by the company. "Auto Trade" is a similar paper issued for the other side of the business. The 1100-page catalogs distributed by the firm are published in conjunction with the Electric Appliance Company of Chicago, Dallas and New Orleans, with which the

Pacific Coast concern is associated, though forming an independent organization. Special pages are inserted to cover conditions in this section of the country.

There is, of course, a complete catalog covering the automobile supplies sold by the company, which is published separate from that of electrical appliances.

A feature of the advertising is the issuance of a "Red Special" leaflet, printed in red ink on good white stock, and sent out to the entire trade list with the monthly statements. Each broadside "plays up" in an attractive manner some particular electrical device or automobile accessory which demands a strong market.

Office Arrangements to Help the Salesmen —

In all the details of office arrangement the Electric Appliance Company stands squarely behind its salesmen. Proper attention is paid to display of wares in the building occupied by the company at 807 Mission Street, San Francisco. This modern structure, consisting of six floors and a basement, is taken up entirely with the stock, and the accompanying illustration indicates the manner in which the trade lines carried by the house are shown upon the building-front. The street floor contains a display and sales room, and the show window presents a changing exhibit of electrical ware, to draw the attention of the visiting dealer. On the second floor are the general offices.

Behind the salesmen, and all the members of the organization, stands the wholesome business policy embodied in the printed announcement which is posted prominently on the walls of the offices. It merits wide circulation:

IMPORTANT NOTICE

Honesty is expected, as a matter of course, in the operation of our business. All service must be real. It is the policy of this Company to be absolutely honest in its dealings with its customers, its creditors, its employes, and its stockholders.

All materials must be of high grade. All weights, measures and counts must be accurate, and all book and other entries must be correct. There must be no deception or false entries, or anything done under any circumstances, not strictly in accord with the principles of honesty.

Each one employed, from the highest to the lowest, must carry out in good faith the policy of this business, which will not be changed under any circumstances.

ELECTRIC APPLIANCE COMPANY

The Electric Appliance Company has been established in San Francisco since June, 1904, and by the application of progressive business policies has developed to an organization of about 100 people. The principles of the California Electrical Cooperative Campaign are heartily endorsed by the management and it is ably represented in the ranks of the Salesmen's Auxiliary.



California Electrical Co-operative Campaign

(Plans for cooperative advertising which look forward to full page presentations of the electrical idea are among the developments proposed by the California Electrical Cooperative Campaign for the near future. The success of the solicitor salesman campaign is already apparent and the interesting figures presented here tell their own story of actual achievement.
—The Editor.)

SALESMEN'S AUXILIARY GROWING

When the establishment of an auxiliary sales organization to supply contractor-dealers with competent and first-class salesmen for house to house canvassing was first proposed, the project was looked upon, no doubt, as something of an experiment. So ready have contractor-dealers been, however, to avail themselves of this service and so satisfactory have been the results, that it may now be said to have passed the experimental stage and to have grown into something of an institution. From partial reports recently presented to the Advisory Committee, the fact became known that at the present time over a hundred salesmen are now engaged in this service in various parts of the territory covered by the Campaign. Such a result, growing out of small beginnings, demonstrates the need that has been filled in this way, and gives encouraging promise of growing sales in the future.

It is expected to give a more comprehensive account of this interesting feature of the Campaign activities in a later issue when more complete data is available.

COOPERATIVE ADVERTISING

Some very tangible results are now being attained in cooperative advertising effort between central stations and contractor-dealers. At the meeting of the Advisory Committee, conducting the California Electrical Cooperative Campaign, held in Los Angeles on September 19th and 20th, definite plans were formulated for launching a more extensive campaign of advertising along these lines. It is proposed that these two branches of the electrical industry take an entire page weekly in the metropolitan papers, the central station advertisement occupying the center of the page with the contractor-dealer display filling the remaining space. In the brief time that has elapsed since the adoption of the plan it has already been put into practice in several of the larger cities of California and its attention-compelling effect has been manifested in a very gratifying way. By this means, the central idea of the Campaign, cooperative effort, and its successful fruition are graphically illustrated and give striking evidence of the good results thus far accomplished.

Perhaps it should be stated that cooperative advertising is not initiated in this plan. As all who have observed the progress of the Campaign will recognize, it is a development of the advertising service that has heretofore been given. On this page are illustrated four advertisements, the latest of a series of advertisements, copy for which has been regularly furnished by the Advisory Committee for use by

central stations and contractor-dealers. These have, however, been used more or less independently, the dates of publication varying over a range of a week or more. This service will be continued, effectively supplemented by the concentrated effort outlined.

RETURNS FROM SOLICITORS

A return made to the Advisory Committee by Mr. A. W. Childs, superintendent of sales for the Southern California Edison Company, is of especial importance to central stations. In the southern section of the state 37 electrical dealers have a total of 60 outside salesmen. Mr. Childs estimates that each solicitor represents a saving and return to the central station in the territory in which he is operating of \$1,700 a year. This figure Mr. Childs arrived at after many years of experience and observation as superintendent of sales for the Southern California Edison Company. Based on Mr. Childs' figure the 60 solicitors would then represent to the central stations in the southern section of the state a saving and return of \$102,000 a year. The definite total in

Please Use These Advertisements on the Date Shown on Each One, or Afterward, But Not Before.
If You Cannot Use Them in Size Shown Here (4 Columns, 12 Inches), They
Can Be Set In Smaller Type (Say 2 Columns, 6 Inches).

California Electrical Cooperative Campaign
Advertisement No. 10—October 15, 1919

Electricity Will Solve Your Servant Problem

Housework the old way is hard work—tiring and most monotonous. The woman should be required to do it without weariness. Servants are not at the command of the household at her expense.

Put Electricity to Work

It will serve as efficiently as the horse in the office, store or factory. With it one woman can do as a few years ago many women are taking days and weeks to do without it.

The electric washing machine, sewing machine, vacuum cleaner, range, dishwasher and iron save labor and time.

Reasonable prices and many time payments make these labor and time saving devices within the reach of every household.

The low operating cost makes these practical investments.

We will gladly give you any information desired on operating costs and rates. Your Electrical dealer carries the article named.

(SIGNATURE)

California Electrical Cooperative Campaign
Advertisement No. 11—October 15, 1919

Why Hug The Kitchen Stove or Fireplace?

On cold autumn mornings and winter days, if you run an electric heater, you can keep yourself warm and cozy in the heart of the home at any hour.

Electric heaters are built to carry and when attached to a bathroom or kitchen, produce radiant heat—the same kind that appeals to the senses of the body.

On a cold morning press a button and dress in the heater's glow. Take it to the bathroom when you bathe. During the day or night work or read or rest with it basking you.

An electric radiant heater costs little to purchase and consumes about the same amount of electricity as a lamp as an electric iron. It is a comfortable convenience. Furthermore, you carry the heat with you and use it when and where necessary.

We will gladly give you any further information you desire on the electric radiant heater. Your electrical dealer can supply you.

(SIGNATURE)

California Electrical Cooperative Campaign
Advertisement No. 12—October 15, 1919

The Day-Light Saving Law Has Been Repealed

Evenings are growing longer and days shorter. Then should we not conserve? People must work, live and rest under electric light.

Are lamp sockets filled?
Are electric lights making the home more beautiful, convenient and comfortable?

Is the proper lighting effect adding to the attractiveness, distinction and individuality of the store and in windows?

Is the factory running at top speed and the workman producing maximum results under satisfactory lighting conditions?

There are appropriate electric lights and clean, adequate lighting for every place and every purpose. We will gladly give you any desired information and advise you strongly to ask away your particular problems with your Electrical dealer and installer.

(SIGNATURE)

California Electrical Cooperative Campaign
Advertisement No. 13—October 15, 1919

An Electric Washing Machine Is Just What You Need

It will wash in less than half the time required by the old crank hand wash, because it cleans more pieces at the same time.

It will do away with hard labor; electricity does the washing and wringing.

It will wash the clothes cheaper than a wash woman, the electricity used costs less than a cent an hour.

It will wash cleaner without wearing out clothes and without broken buttons; because warm, soapy water is gently forced through all fabrics, cleaning heavy and fine silks, and the wear and tear of washboard rubbing is eliminated.

We recommend the electric washing machine and will gladly give you any information we may have on the subject. All electrical dealers sell electric washing machines.

(SIGNATURE)

An example of the effective cooperative advertising planned from month to month by the California Electrical Cooperative Campaign

the north is not at present known but more than equals the number in the south. A conservative estimate would be that the solicitors now employed in the state of California as a result of the efforts of the California Electrical Cooperative Campaign represent a return to the central stations for this year of more than \$200,000. So important is this phase of the work that it is being made the subject of special study by the Commercial Section of the Pacific Coast Section, N. E. L. A., of which K. E. Van Kuran, district manager at Los Angeles of the Westinghouse Electric & Manufacturing Company, is chairman.

PRACTICAL EVIDENCE

The following extracts are from letters received by A. L. Spring, Field Representative of the California Electrical Cooperative Campaign, and are interesting evidence of the way in which dealers are

taking advantage of the service offered by the Co-operative Campaign:

Dear Mr. Spring:

We expect to get into our new building the early part of next week. The carpenters and painters are busy this week getting things in shape. Would be very glad to have any further suggestions from you regarding the arrangements, decoration, etc.

After we get settled we will be very glad indeed to have you inspect our new quarters.

Dear Sir:

We have secured a lease on a Main street store. It is being remodeled for us, and we expect to be moved in by May 1st.

If you are out this way, we would be glad of any suggestions you might offer.

In commenting on these Mr. Spring adds: "Of course, in addition to the dealers who request us, we are continually in our work on our regular calls laying out and rearranging stores."

Just Jones Deals in Household Appliances

BY J. H. MOSELEY

(In his first article on organizing a retail electrical business, progressive "Just Jones" outlined a sales policy calculated to set any new dealer squarely on his feet. Now this same sane authority dispenses advice on specialization in electric household appliances. He talks about advertising, too—and J. H. Moseley, originator of all the Just Jones ideas, is an experienced expert in advertising electrical wares.—The Editor.)

Having firmly established the retail business of "Just Jones," I have decided to make a specialty of electric household appliances.

Household appliances are sold to two classes of customers: those who are already educated to the use of electrical devices, and those who are not. In my remarks of two weeks ago, I indicated how a follow-up mailing system could be developed for the creation of special branches of business.

Here again my mailing and prospect list comes into play. This list should be divided into the two classes above given and I should work out a schedule of attack.

Planning the Systematic Drive

This might be somewhat as follows, according to the local conditions:

- A. Electric Irons
- B. Electric Toasters
- C. Miscellaneous Table Appliances
- D. Electric Sewing Machines
- E. Electric Washing Machines
- F. Electric Vacuum Cleaner
- G. Electric Ironing Machine
- H. Electric Dishwasher
- I. Electric Range

This at once suggests the sub-division of my mailing list into additional classes.

As soon as a customer has been sold an Electric Iron, I shall put him in the 1-B Class and start working on him for an Electric Toaster.

As soon as he has been sold an Electric Toaster, he will be put in Class 1-C and I shall start working on him for Miscellaneous Appliances.

It may be advisable to combine Class 1-C and Class 1-D.

The logic of having such a schedule can be seen without explanation.

In case a customer in class 1-D purchased a vacuum cleaner this would be noted on the card but

the customer would still remain in class 1-D. After this customer had been sold a sewing machine she would then be transferred to class 1-E. After she had been sold a washing machine she would then be put in the 1-G class as she would already have a vacuum cleaner.

This schedule should be arranged to suit local conditions, so as to follow the lines of least resistance.

Educating the Backward Prospects

The second class of customers, those not already educated to the use of electrical devices, should be approached from an educational standpoint. Perhaps I will have none of this class in my town. If this is the case, I am fortunate.

After selling an electric iron to customers of this class it will be easy to gradually sell them other appliances.

I shall keep in mind that I am working not necessarily for the sale of one electric iron but for the ultimate sale of a complete electric home. In other words, to go after this business on the assumption that I am going after a \$1,500 or \$2,000 customer. This is what the business will eventually amount to, and it is worth looking at from this standpoint.

Keeping this idea in mind also when new houses are being built, it will be easy to sell a complete electrical installation for a new home, provided the builder is approached in the proper manner.

The time is coming when electrical household equipment will be sold in units just like bath room equipment and I might as well start my activities along that line now.

Advertising, Personal and Persuasive

The smaller the town, the more personal can be my advertising. The telephone is an excellent adver-

tising medium for small towns and is also useful in the larger towns in campaign work.

I shall make it a point to call up my prospective customers periodically and let them know about the new appliances which I have received.

I shall use the telephone by all means when I am conducting a special sale.

With the right kind of mailing list, circular letters are very effective, provided there is something definite to be said. The installation by me of a complete electrical home would make the subject of a very interesting letter. The saving by Mrs. Brown of \$150.00 in a year, through the purchase of a washing machine, would also make interesting reading.

I am going to make my circular letters specific and personal.

Newspaper advertising should be used as my business grows to the point where I can afford to keep it up continually. The ideal newspaper advertising schedule for an electrical dealer contemplates the featuring of something special at least once a month, in dominating space. This plan will not only make many actual sales but will keep my name before the public.

If such a plan is not followed, then periodical insertions of small copy, at least twice a week (every other day if possible), should be made. In order to insure that this small copy be interesting it must be kept "newsy," so that people will be continually looking for it.

Here again advantage can be taken of the work I am doing to make my advertisements specific and personal.

Copy should be planned two weeks or a month ahead, so that an occasional rush of work will not interfere with my schedule and cause my copy to become "dead."

Working all Details Together

Coordination of advertising and publicity is essential. If I am talking about washing machines in my advertising, I must be sure to make my telephone conversations, circular letters, show windows, the interior of my store, my salesmen, delivery men and my repair men talk the same thing.

If I am to try out the effect of merely calling customers' attention to an article, I shall take some slow moving stock and make it a point to mention this article to every customer who enters my store. If I keep this up for a week or ten days, always calling attention to the uses of the article to persons who are interested, I shall find that the slow stock will begin to move.

I shall start on such a scale so that I can keep building.

It is the easiest thing in the world to start a business with the blare of trumpets and be forced to discontinue because expenses cannot be met. It is much better to start in a small modest way and keep everlastingly adding a little each month and each year as business grows.

EDUCATING THE SALESMAN

(The growing importance of the salesman in modern business is making his profession one which requires wide qualifications and special training. The following outline gives some of the points brought out in a recent exhaustive discussion of the subject.—The Editor.)

An interesting analysis of the problems of the salesman was undertaken at a recent three-day session of the Associated Advertising Clubs of the World.

It was pointed out that the salesman must analyze—

Himself
His merchandise
His customer

How Salesmen Can Analyze Themselves —

The average salesman does not realize his own handicaps or his own assets. The simplest way for him to understand his opportunities is to study the four things which go to make up every successful salesman:

Appearance
Language
Intellectual ability and knowledge
Social life.

Appearance has a great deal to do with the successful selling of any merchandise shown and sold in a retail store.

In a discussion of language the simplest way to study English was taken up, and four methods outlined:

Study of grammar
To write
To read
To cultivate educated people

It was pointed out among other things that imagination is essential to the growth of the salesman. The different types of imagination were discussed in detail.

Analyzing Customers —

Customers are analyzed according to their ages, and the quickest way of approach is determined by the psychology of the various age periods. Other factors which are of vital importance to this aspect of the work were summarized as follows:

Social position of customers. How to classify them quickly according to their vocations, and position in the community.

Quick analysis of the intelligence of any community—showing the low priced customers, the medium and high priced customers.

The importance of understanding the period of attention on the part of customers.

The best time of the day for customers to shop. Why they shop in the afternoon instead of the morning.

How to introduce new styles and new merchandise and get the customer to understand the ideas quickly—based on certain laws of psychology.

The law of mental activity.

The law of Yes and No. How to keep the customer in the "Yes" attitude.

Different types of customers classified according to their physical make-up.

The five methods that customers use in deciding.

The final points taken up were the study of merchandise and the methods of advertising a retail store, the discussion covering about ten retail lines of business.

Technical Hints

BY LOUIS ETSHOKIN

(The refusal of voltage to build up is an occasional generator problem which the contractor-dealer is called upon to remedy. The reasons back of such trouble and the fundamental explanation of the phenomenon of constant voltage are here made clear. The author's experience with practical problems as an instructor in the U. S. Navy have given him an intimate familiarity with the difficulties which arise in the field. This is the first of a series by Mr. Etshokin, the next of which will appear in the Nov. 15th issue.—The Editor.)

CONSTANT VOLTAGE ON SHUNT D.C. GENERATORS

Most electricians have wondered at times why it is that a shunt or self-excited d.c. generator, will build its voltage up to a certain given point, and then stop, and hold this voltage.

The basis of this is in the property which iron has of becoming saturated with magnetic lines of

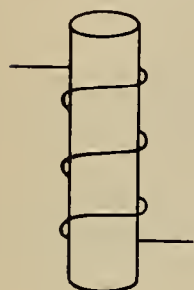


Fig. 1

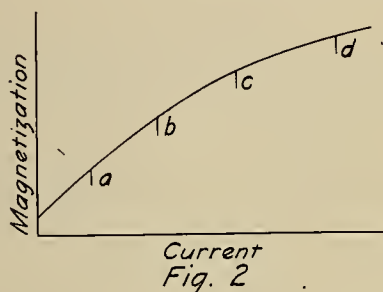


Fig. 2

When the current is increased in a coil of wire around an iron bar, as shown in Fig. 1, the magnetization of the iron is increased in the ratio indicated in the curve shown in Fig. 2.

force. That is, if we have a coil of wire around an iron bar, and we gradually increase the current in the coil, the magnetization of the iron will not increase in the same proportion, but will follow a curve, somewhat as in Fig. 2.

The points a, b, c and d represent four equal increases of current, but not four equal increases of magnetization. The greater the magnetization, the greater is the increase of current necessary to produce an equal increase of magnetization.

Now the voltage generated in a generator is proportional to the rate of cutting lines of force. This means that considering speed constant, the voltage in a given generator is proportional to the strength of its magnetic field. But in a self-excited generator, represented diagrammatically by Fig. 3, the magnetizing current is dependent upon the generated voltage. This magnetizing current is equal to the generated voltage divided by the resistance of the field, and can be represented by Fig. 4. We have seen that voltage is directly proportional to magnetization, so we can change magnetization to voltage in Fig. 2.

Now let us combine Fig. 2 and Fig. 4 into Fig. 5. We start off with a little voltage as soon as the generator speeds up. This voltage, ab, is due to the residual magnetism in the machine. In turn, this

voltage 'ab' produces a magnetizing current 'c' in the field. The magnetizing current 'c' produces a voltage 'd.' The voltage 'd' produces a current 'e,' and so on until 'k' where the two curves cross. The voltage at 'k' would be the stable voltage.

If we added resistance to our field circuit, the curve 'c, e, g, i' would be steeper, and our voltage or

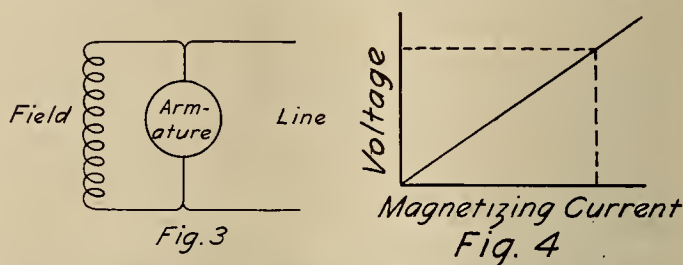
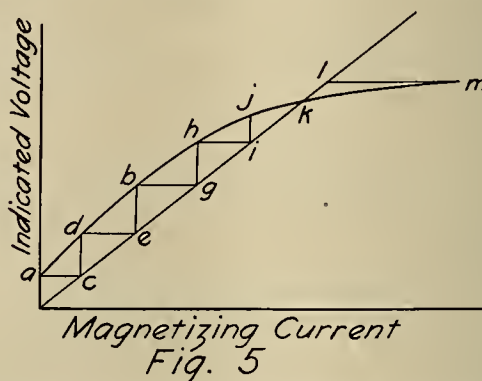


Fig. 3 represents a self-excited generator, in which the magnetizing current depends on the generated voltage. Fig. 4 shows the relation of the magnetizing current to the generated voltage and the resistance of the field.

crossing point would be lower. If we decreased the field resistance, the crossing point or stable voltage would be higher.

The question now arises, as to why the voltage stops at 'K.' Why does it not go on to 'm'? Say it did. It would then produce a current 'l' which would produce a voltage 'k' again.

It is plain, then, that the saturation property of iron is responsible for the fact that we can obtain a certain definite voltage in a self-excited generator.



The voltage ab produces in the field a magnetizing current c which in turn produces voltage d. The voltage at k represents the stable voltage, this being obtainable on account of the saturation property of iron.

There are two very common troubles that arise in this type of generator, each one causing a refusal of the voltage to build up.

One of these troubles is loss of residual magnetism due to vibration, effect of other electrical machinery, etc. This is evidenced by a zero voltage.

The other trouble is due to a reversal of this residual magnetism. Quite frequently when a machine is first connected up, the leads from the armature to the field are wrong, and the machine will not build up its voltage for the simple reason that the voltage produced in the armature by the residual, sends a current through the field that destroys that very residual.

Once these troubles are recognized the remedy is obvious. They are the first things to look for when a shunt generator refuses to build up.

Purchase of the Lake Cushman Power Site

(Tacoma's election on the purchase of the Lake Cushman power site gives the City Council the right to complete the negotiations with the Skokomish Power Company. Following is an outline of the conditions which led up to the city's decision in the matter.—The Editor.)

The Nisqually Plant Inadequate —

The Nisqually Power Plant complete cost the city of Tacoma \$2,242,024.94, financed as follows:

General bonds	\$ 300,000.00	
Light utility bonds	1,700,000.00	
Cash from earnings	242,024.94	
Total amount of bonds issued.....	\$2,000,000.00	
Amount of utility bonds paid.....	\$568,500.00	
Amount now in sinking fund.....	351,895.37	920,395.37
Balance of bonded debt after apply- ing sinking fund.....		\$1,079,604.00

The capacity of the Nisqually Plant is 32,000 horsepower, in four units of 8,000 h.p. each. Penstocks, gates, reservoirs, conduits, tunnel and intake are large enough to supply this power.

The plant is not able to furnish the maximum capacity for the entire year. Low water capacity is 9,500 h.p. continuous. The period of low water is about three weeks, usually in September or October. There are sometimes low water periods in January, when the maximum is reduced at times to 15,000 h.p. and frequently lasts ten days.

The amount of additional storage available at the plant would be small, not more than 10,000 h.p., and the unit cost would be high. Some have asked whether the water could not be used again below the present plant. This would require the construction of another power plant and the expense would be much higher than at Lake Cushman.

Steadily Increasing Demand —

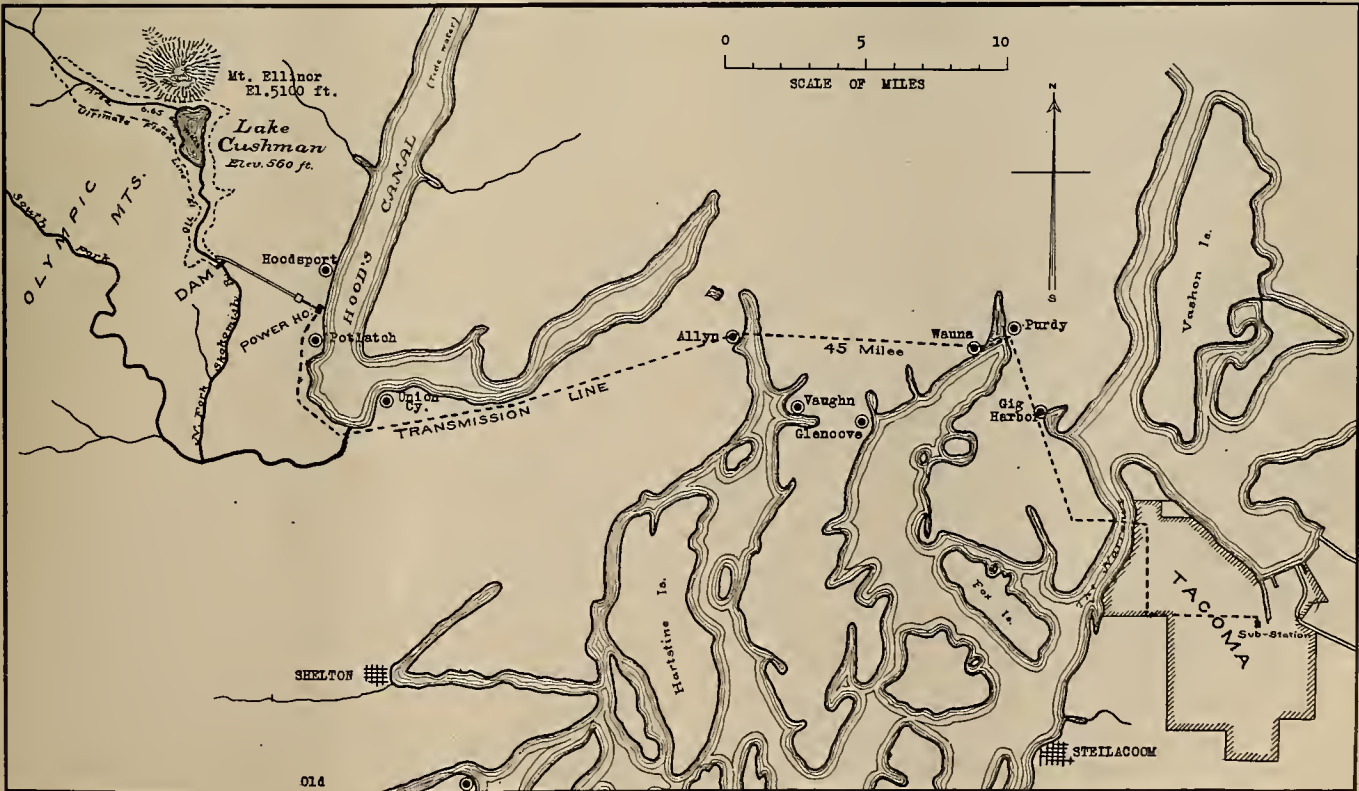
At the present rate of increase the power demand in the city will have reached the limit of the

plant's capacity within two years. Prior to the last three years the increase in domestic consumption was about 10% per year. For the last three years it has been 33%. Figures for the present year indicate that this latter rate of increase will be maintained. Within two years additional power for domestic use will be needed.

At the same time the city sells power for commercial purposes, to reduce the cost of domestic power and light by obtaining an income from the current generated in the daytime when there is little demand for domestic customers; also to encourage industries, small and large, which contribute largely to building up a city. The demand for commercial power is increasing and has increased at the rate of about 10% per year for the past twenty years.

A New Source of Power —

The price for the acquisition of the Lake Cushman site is \$300,000, payable in utility bonds, bearing interest at six per cent, payable only out of the earnings of the plant, not by taxation. Ninety per cent of all necessary lands are now controlled by the Skokomish Power Company. According to the contract the city shall be given a perfect title to all lands, rights-of-way, water rights, rights to overflow, reservoir, easements and privileges necessary for the ultimate development of this power project; including also rights-of-way, franchises on county roads and other easements to provide for a double transmission line and telephone line from the pro-



Map showing the power project planned in the development of the Lake Cushman site

posed power station on Hood Canal to the line of Pierce county, a distance of 20 miles.

The lowest water gaugings made at Lakeushman by the U. S. Government so far recorded assure 75,000 h.p. on a 50% load-factor basis. To build the plant, transmission lines, sub-station, etc., will cost \$6,500,000.00—that is, \$86.67 per h.p., as against \$118.00 per h.p. at the Nisqually plant.

There is a low water period at a different time of the year from the low water period on the Nisqually; also, the storage to be provided at Lakeushman will protect against low water. The storage basin will be nearly a mile wide and about 10 miles long. This will provide storage enough to keep the full power of the plant going across low water periods.

Training Librarians to Serve Business Needs

(The recent articles on the Business Library by Louise B. Krause which have appeared in the Journal of Electricity and which are now being put into book form, have awakened much interest among business men in the part the library may play in the modern business organization. In line with the recognition of its importance comes the announcement of the business library courses planned for the coming Riverside Library School, at Riverside, California. For the interest of readers who may wish to take advantage of the opportunity offered, a brief outline of the scope of the work and its general plan is here given.—The Editor.)

To meet the requirements of business men for library service giving up-to-date information, the Riverside Library Service School announces an enlarged and extended program for training students for this important work. It purposes to train librarians for library work in business houses and also to give public library workers an understanding of what the business man really needs and wants along the line of printed information; how to procure the material and how to get it to the business man in a prompt and effective manner.

This movement of the Riverside Library Service School is in line with the present day movement in all progressive education, namely, a rational compliance with and conformity to what is going on in the world today and to what the world requires of its workers in order adequately to meet its growing problems.

In addition, therefore, to the established library courses, cataloging, classification, reference work, bibliography, etc., which have been given in library schools for a number of years and which are the necessary foundations of all successful library work, Mr. Joseph F. Daniels, director of the Riverside Library Service School, has arranged to offer in his Winter School program two additional courses for training in business library work.

The Business Library

One course will be on "The Business Library," its organization, administration and its special information problems, to be taught for four weeks by Miss Louise B. Krause, librarian, H. M. Bylesby & Company, Chicago, who is an authority on the subject and well known to the readers of the Journal of Electricity as the author of the series of articles on "The Business Library" which have appeared in the Journal during the past year. Miss Krause brings to the teaching of this subject not a mere theoretical knowledge but a large fund of practical experience and knowledge of business conditions due to her ten years of library service in the business world.

The Vertical File

The other business course will be on "The Vertical File" and its uses, given by Miss Virginia Fairfax, librarian, Carnation Milk Products Company, Chicago. Vertical filing is one of the most valuable

tools which have been introduced into modern business. It fills a need in taking care of correspondence, office records, blue prints, photographs, trade catalogs, pamphlets, and all miscellaneous printed information which are found in the business office of today. The course on "The Vertical File" as planned by Mr. Daniels is designed to teach both business librarians and public and school librarians how to use this valuable tool most effectively in the handling of information.

A large part of the newest and most reliable information to be found in print today is not in books but in unbound material, such as pamphlets and leaflets, and the public library which does not keep this information up-to-date and on ready file is behind the times in giving efficient service to its community. The day is passing when the public library can afford to consider its field as dealing only with information that is in a cloth bound book and of sufficient size to be easily taken care of on a shelf. The course, therefore, will give instruction in the filing and indexing of library material in vertical files. It will also give instruction to librarians in the filing of correspondence.

The subject of business letter writing will also be taught in this course. This instruction will not treat of "How to Write Letters that Sell" but will give instruction covering the style and mechanical makeup of a business letter of which students who have not had business experience or training are usually ignorant.

In addition to these two courses, instruction will be given in the following subjects by well known teachers of established reputation:

- Book Binding, by W. Elmo Reavis.
- Periodicals and Serials, by Mrs. Mabel F. Faulkner.
- Reference Books, by Miss Lillian Dickson.
- Library law, Library finance, taxes, etc., by Jos. F. Daniels.
- Children's literature and story telling, by an expert to be announced soon.
- Cataloging and Classification, by an Eastern teacher to be announced soon.
- Book selection, book market, etc., by Jos. F. Daniels.

The state of California is to be congratulated on this advance movement in library education so ably inaugurated by Mr. Joseph F. Daniels, and it will no doubt attract many students not only from California but from all parts of the United States.

Proposed Plans for the All-American Canal

(An important engineering project involving the agricultural and power interests of the Pacific Southwest is that of the All-American Canal proposed in the report discussed below. An extensive power development is contemplated to meet the needs of both the Yuma project and the fertile Imperial Valley.—The Editor.)

The Final Report of the All-American Canal Board which was recently submitted to the Secretary of the Interior and to the Board of Directors of the Imperial Valley Irrigation District presents a discussion of the problems connected with the construction of a canal located entirely in the United States, taking water from the Colorado river at the Laguna



The intake of the present canal system at Laguna Dam

Dam and delivering it to the distributing system of the Imperial Valley, California, and recommends that the United States Government assist in the financing of this enterprise.

The Canal Board was appointed under the provisions of an agreement between the Secretary of the Interior and the Imperial Irrigation District; the members being Dr. Elwood Mead of the University of California, W. W. Schlecht of the United States Reclamation Service at Yuma, and C. E. Grunsky, Consulting Engineer of the Imperial Irrigation District.

The sum of \$45,000 was provided for the necessary surveys and preliminary studies, and use was made of the records and office facilities of the U. S. Reclamation Service which were placed at the disposal of the Board. Porter J. Preston was the engineer in charge of surveys and examinations. A preliminary report transmitting a tentative cost estimate was submitted in December, 1918.

Construction Details —

The report discusses the larger problems of the Colorado river and points out that the danger of the river within Lower California again taking a course to the north is increasing. It can only be restrained for the present by artificial barriers. The Board recommends, among other things, that the United States should cooperate with Mexico in putting the Colorado river upon a direct course to the Gulf of California and in holding it on such a course. The United States should also in the near future provide for the storage of some of the flood flow of the river in the upper regions of its watershed, which would

make more water available than at present for irrigation, and would incidentally cut down the peak of the river's flood discharge.

The All-American Canal as proposed will receive its water at the Laguna Dam. For ten miles it will carry water for the Yuma project as well as for the Imperial Valley lands. Enlargement and modification of the existing Yuma canal, and structures to take care of the increased volume of water are recommended. The Board states that the method of desilting the muddy Colorado river water as at present in practice at the Laguna Dam can be successfully applied to the diversion of 10,600 sec. feet, now contemplated when the river is at stages in excess of the canal requirements, but recommends an additional large capacity sluice or waste gate about 1¼ miles below the dam, to aid in removing from the canal any sand not dropped in the desilting chamber above the headgate.

The capacity of the proposed canal below the diversion point for the water of the Yuma project is to be 9000 second feet. The course of the canal will lead around the eastern and southern slopes of Pilot Knob, thence closely following the California-Mexico boundary line for several miles. It makes a detour to the north in passing through the area of drifting sand hills lying west of Pilot Knob, the length of canal in this detour being about 11 miles. The magnitude of the excavation in the 20-mile length of the canal from Pilot Knob to the East Side Mesa Canal No. 1, which includes this sand hill section, can be seen from the figures given in the report: rock 312,000 cu. yds. and earth 48,506,000 cu. yds. Blow-sand that will be blown into the cut during construction from the drifting sand dunes is estimated at 500,000 cu. yds. The total length of the canal is about 65 miles.

Generation of Electric Power —

By making use of the drops in elevation below the points where the water for the Yuma Mesa and for the lands lying northward of the Salton Sea are to be diverted, electric power will be generated and utilized for the pumping of water to the Yuma Mesa lands and to the highlands of the East Side Imperial Valley Mesa. The installation at Mesa Power Station No. 1 will use a maximum flow of 6000 sec. ft. with a fall of 24 feet and that at Mesa Power Station No. 2 a maximum flow of 5500 sec. ft. under a head of 47 feet. The location of a temporary power station near Pilot Knob is proposed to make power available for the Yuma project and to meet the requirements of the Imperial Irrigation District which is operating several dredges near the head of its present canal, which will have to remain in service three or four years while the All-American Canal is under construction. This station will be operated with water taken from the upper section of the new canal

and delivered into the present main canal of the Imperial Irrigation District.

Cost of the Undertaking —

The estimated cost of the 65 miles of canal, including the remodeling of existing structures but not including the power plants, is \$20,555,091, of which \$17,137,366 would be borne by the present Imperial Irrigation District, \$992,814 by the United States for the Yuma project, and \$11,424,911 by the

outside lands for the irrigation of 400,000 acres for which the canal would furnish water. An item of \$1,900,000 payable to the United States for the Yuma project in deferred payments, for the right to connect with the Laguna Dam, is a part of this cost estimate.

The estimated cost of installing the proposed power plants is \$1,231,523 for Mesa Power Station No. 1, \$1,632,965 for Mesa Power Station No. 2 and \$522,780 for the temporary plant at Pilot Knob.

Registration of Professional Engineers

(The question of registering professional engineers is one which has been the subject of animated discussion all over the country. The scheme has recently become law in Oregon, and it will no doubt be of interest to engineering circles to see how the system is working out in actual practice.—The Editor.)

The State Board of Engineering Examiners in Oregon is now fully organized and prepared to receive applications for registration of the professional engineers in Oregon, and others who expect to practice engineering in Oregon.

Organization of the Board —

The Board has held several meetings to date and has worked out and adopted complete by-laws, rules and regulations for the government of the action of the members of the Board and methods for holding examinations.

Headquarters have been established where the necessary application blanks for registration without examination, and copies of the law and all other information may be obtained on request.

The business of the board will be transacted to a large extent by an executive committee, a finance committee and a by-laws and rules committee.

Requirements of the Law —

Under the provisions of the law, it will be necessary for all those engaging in civil, mechanical, electrical, mining, chemical and all branches of professional engineering, to register.

Registration Without Examination —

Class 1 Applications require the applicant to show that he is more than 21 years of age, that he is of good character, and has practiced professional engineering for at least six years, and that during that period he has had charge of engineering work as principal or assistant for at least two years.

All statements made by the applicant must be attested by him under oath, and in addition the applicant must submit evidence, satisfactory to the board, of the accuracy of the statements submitted by him. While the duty of examining into all details of education and experience of each applicant for registration without examination is not specifically required by the board, the law does require the board to satisfy itself of the general good character, skill and responsibility of each applicant considered in connection with the applicant's desire to practice as a professional engineer.

Registration under this Act is not intended by the state to be a process contrived for the benefit of

professional engineers, but for the protection of the public against the incompetent practitioner, and action by the board toward registering applicants will be directed to this end, and this end alone. For that reason it will be incumbent on applicants to convince the board they have clear records of integrity of character and are professionally competent within the meaning of the Act, to the end that the public interest will be served by their practice of the profession of engineering.

The language of the Act distinctly states that except in the case of honorably discharged soldiers, the board shall only issue certificates of registration without examination on or before January 1, 1920, and that after that date it shall issue such certificates only consequent to examination. All engineers engaged in military or naval forces of the United States are entitled to make applications and qualify for license to practice engineering without examination, at any time within one year after their honorable discharge from the service.

Registration After Examination —

Class 2 Applications for registration require the applicant to show that he is more than 21 years of age, that he is of good character, and that he has been engaged upon engineering work for at least six years, and during that period has had charge of engineering work, as principal or assistant, for at least one year; or in the event that he has not had six years' practice as above, that he is a graduate from an engineering school of recognized good reputation, and has been engaged upon engineering work for at least two years, and during that period has been in charge of engineering work, as principal or assistant, for at least one year. The scope of the examinations are prescribed by the board to cover the education and experience of the applicant as well as certain oral and written tests. The board has determined that 60 out of a possible 100 marks may be given to the education and experience of the applicant, and for convenience both of the board and the applicant it has been decided that the statement and the evidence submitted by the applicant with his application will be the basis of the determination of his rating for education and experience in the examination.

For this reason it is necessary for the applicant to submit a complete record of his education and experience during his entire career. To this end specific references must be given to all educational courses, studies, or degrees received, also to all important work or works with which the applicant has been connected.

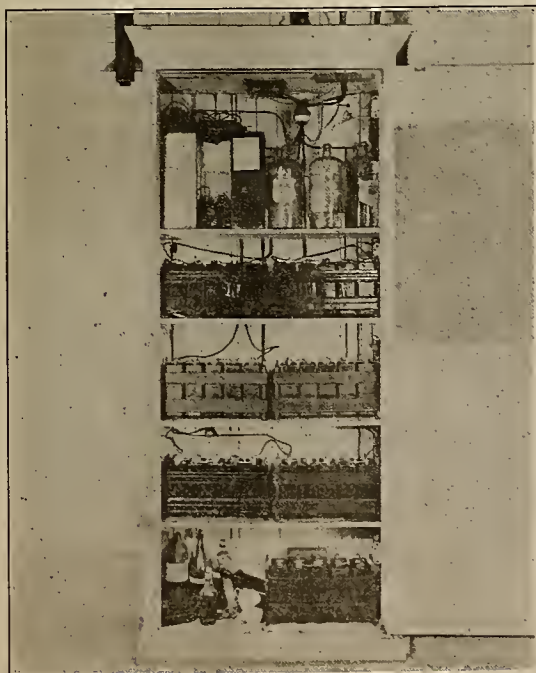
The board may revoke a certificate of registration of a professional engineer for fraud or deceit in his practice; it may also reissue a certificate to any person whose certificate has been revoked, but not after the expiration of one year from the date of the revocation.

The Act does not apply to any professional engineer working for the United States Government; nor to any architect practicing architecture; nor to any professional engineer employed as an assistant to a professional engineer registered under the Act. Any professional engineer coming from outside the state and possessing the qualifications for the practice of professional engineering as provided for in the Act in any branch of engineering, is permitted to practice for a period not exceeding three months before making application for examination under the terms of the Act.

CENTRALIZING THE BATTERIES IN A LARGE PUBLIC BUILDING

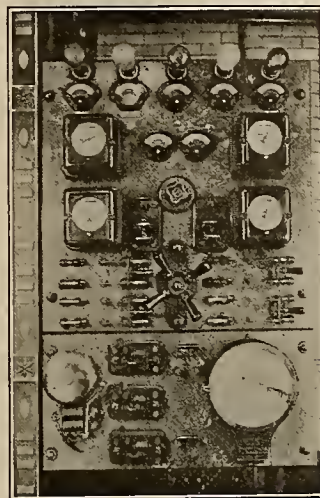
(How the batteries for the entire San Francisco Post Office building have been installed conveniently in one place, resulting in greater efficiency and an appreciable saving.—The Editor.)

Previous to the year 1913, the various clocks, gongs, bells, protection systems, etc., in the main San Francisco Post Office building, at Seventh and Mission streets, were operated by current supplied from gravity batteries, dry cells, Samson, Le Clanche, etc., and these different batteries were located in various places all over the Post Office building.



Edison batteries stored in a single cupboard were substituted for a variety of batteries and cells located in various corners of the Post Office. The extra 5-cell set on the lower shelf is held in reserve in the case of a failure, but up to now this has proven an unnecessary precaution.

In 1913, after figuring out the various circuits and the approximate requirements, it was decided to install all of the batteries for the entire building in the cupboard as shown in the accompanying illustration, and to make this possible it was necessary to



The switchboard is provided with Sangamo ampere-hour meters to indicate the charge and discharge of the four sets of batteries. Some of the circuits are very delicately balanced and it is necessary to have volt meters on each to indicate fluctuations which may occur.

run two buss wires to all parts of the building and taps were made to these buss wires for operating push buttons, bells, buzzers, etc., wherever required.

A switchboard was designed, as illustrated, having four Sangamo ampere-hour meters to indicate charge and discharge of the four sets of batteries, there being 10 cells each of the B4, 80-ampere-hour type on two circuits, and 5 cells each of the same type on two other circuits. To protect against possible emergency, an extra 5-cell set was ordered, to be held in reserve, as some of the circuits are extremely important and it was felt that no chance should be taken as to their failure. The performance of the batteries, however, during the six years that they have been in service, has demonstrated conclusively that the emergency set is hardly necessary.

The batteries are charged as required, from the 220-volt d.c. system, steam engine driven generators producing this current for the operation of lights, elevators, and other power apparatus used in connection with the Post Office. A carbon-pile rheostat is employed to regulate the amount of charging current.

Contacts on the Sangamo meters are connected with relays to give an audible indication when batteries are fully charged, or discharged to the point where same should again be put on charge. There are also volt meters to indicate the voltage on each circuit, and as some of the circuits are very delicately balanced it is important that the voltage be kept within certain limitations, and the performance of the entire installation has demonstrated that this has been attained with a great deal less trouble and expense than under the former system—where it used to be necessary to buy at least \$20.00 worth of dry cells each month, besides a good deal of other battery material, requiring more or less of the time of a man changing out dry cells and replenishing other batteries.

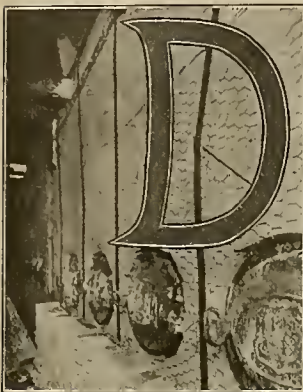
These Edison cells have been in constant service ever since first being installed in 1913.

FUEL OIL AND STEAM ENGINEERING

(The permanent increase in fuel costs is a condition which makes improvements in boiler efficiency of especial importance to users of steam at this time. The insulating material described here by the San Francisco engineer of the Celite Products Company was selected by the Emergency Fleet Corporation for the insulation of some 2000 boilers installed in vessels built for them.—The Editor.)

BOILER INSULATION PRACTICE IN OIL-BURNING STEAM PLANTS

BY A. L. GOSSMAN



An application of Sil-O-Cel brick to outside walls of old boiler settings, partially completed. The insulating brick is covered with wire mesh and afterwards plastered with cement or Celite boiler wall covering.

URING the two years of American participation in the war, the interest of the United States Government in the problem of thermal insulation has served to emphasize the necessity of adequate and dependable protection of steam-generating equipment against heat losses. Heat is a form of energy consisting of molecular vibrations of a periodic character and subject to the general laws of wave motion. It can be transmitted from one place to

another by three methods—radiation, convection and conduction.

By radiation, heat is transferred from one body to another by wave motion without any material agency. This applies only to matter in gaseous state.

Convection is that process of heat transfer in which some portion of the body whose temperature is raised moves to another place in the medium where the temperature is lower, thus tending to

raise the temperature of the medium. This of course applies only to liquids and gases.

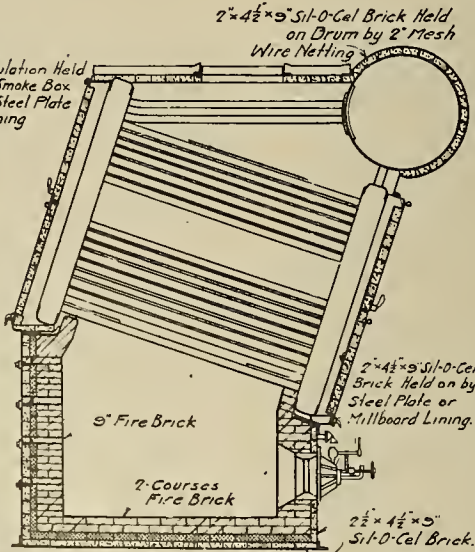
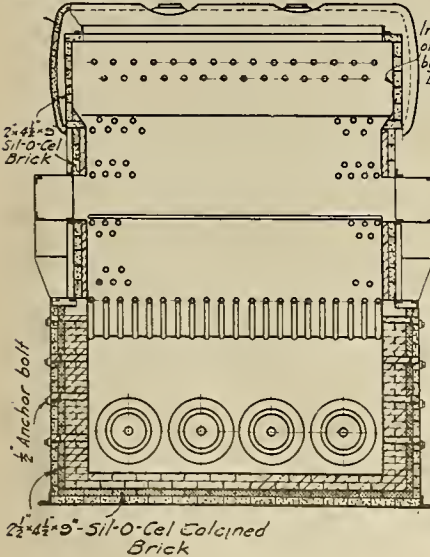
By conduction, heat energy is transferred from a particle at a higher temperature to one at a lower temperature by virtue of their contact. While this method of heat transfer applies to all three states of matter, it is of importance chiefly in connection with solids. It is with this form of heat transference that we are chiefly concerned in the present discussion.

In the case of an oil-fired steam boiler, the heat liberated from the burning fuel is imparted to the heating surface by radiation from the furnace walls and luminous flames and by convection from the moving gaseous products of combustion. It then travels by conduction through the soot, metal, and scale to the wet surface, whence it is transmitted chiefly by convection into the boiler, resulting in the generation of steam.

The heat loss which is largely preventable by insulation occurs when the heat transferred to the walls of the combustion chamber is conducted to the outer surface and dissipated into the atmosphere through radiation and to some extent through convection currents in the boiler room.

The rate of heat conductivity through a wall depends on the resistance of the component materials, being proportional to the temperature difference between the two surfaces, directly proportional to the thermal conductivity of the material, and inversely proportional to the distance between the two sur-

Ends of Drums Covered With Sil-O-Cel Plastic Cement Supported on Wire Mesh with $\frac{3}{8}$ " Hard Finish



For equipment, having steel casings where a bond between the casing and the fire brick is required, the insulating brick are laid with broken joints, a bonding brick header projecting through the insulation to the casing. These bonding brick are bonded to the casing by means of one-half inch tie bolts as needed.

Sil-O-Cel Colcined Brick	Marine or Steel Encased
Sil-O-Cel Powder	Boiler
Sil-O-Cel Brick	Insulated With Sil-O-Cel
Sil-O-Cel-G3	
Fire Brick	
Sil-co Brick	
Red Brick	

faces. This relation is conveniently expressed in B.t.u. per hour per square foot by the following formula, in which H represents the quantity of heat conducted; d , d_1 , and d_2 , the thickness of the component layers in inches; c , c_1 , and c_2 , the thermal conductivity in B.t.u. per square foot per inch thickness per hour per one degree difference in temperature F . at the average temperature of the component layers of the wall; and the expression $(t_2 - t_3)$, the temperature difference between the respective surfaces.

$$H = \frac{1}{\frac{d}{c} + \frac{d_1}{c_1} + \frac{d_2}{c_2}} (t_2 - t_3)$$

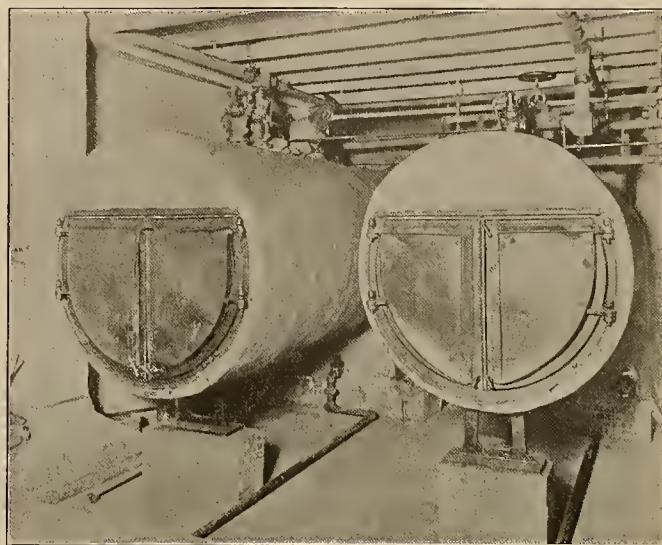
Properties of an Ideal Insulator

The object of insulation is to interpose somewhere between the two surfaces of the setting wall a material which, having a low conductivity factor, will resist the passage of the heat waves. The insulating properties of such materials are usually due to the presence of confined air in numerous small cells or voids. Therefore, roughly speaking, a material having a low apparent density is considered to be a good insulator.

However, if the voids are too large, they tend to propagate heat by radiation and convection. This fact was not appreciated, and, indeed, a hollow wall

such an air space is a better transmitter of heat than even as dense a material as a fire brick.

The properties of such an ideal insulator naturally do not fit it for use as a high temperature



This shows insulation in plastic form applied to two 100-hp. fire-box boilers. It was applied in three coats, reinforced with one-inch 20-gauge wire mesh, and covered with 16-oz. canvas duck.

refractory, and it is therefore installed as an insulating backing to the regular refractory lining. The saving in fuel alone will often repay the first cost of insulation in less than a year, especially in cases involving large-scale production.

However, the property of low thermal conductivity is not the only requirement of a good insulator. It is necessary for the engineer to consider not only the first cost and thermal efficiency of the material, but also the length of dependable service rendered in his particular field. The material therefore must be so constituted as not to be affected by the temperatures encountered behind the refractory lining of a boiler setting. Furthermore, it must be convenient in form in order that it may be readily applied, and it must have sufficient mechanical strength to fit in as part of the general construction without any fear that it will suffer from strains set up in the walls.

An Effective Insulating Material

A material having a surprisingly large number of these properties is a highly siliceous mineral known as "Celite," from which the commercial forms of "Sil-O-Cel" insulation are manufactured.

Sil-O-Cel not only has a low conductivity factor, but it is unique among insulators in that it has a melting point of 2930° Fahrenheit as reported by the Bureau of Standards. This product also has sufficient mechanical strength for use in boiler settings, the brick of standard fire brick size having a crushing strength of over 400 pounds to the square inch.

Being supplied in the form of brick of standard fire brick sizes, powder, and plastic cements, Sil-O-Cel is readily adapted to widely varying types of construction.

In the majority of brick settings it is possible to use what is known as a "core wall" construction, in which a 2½-inch or 4½-inch course of Sil-O-Cel brick is laid up between the fire brick and the red

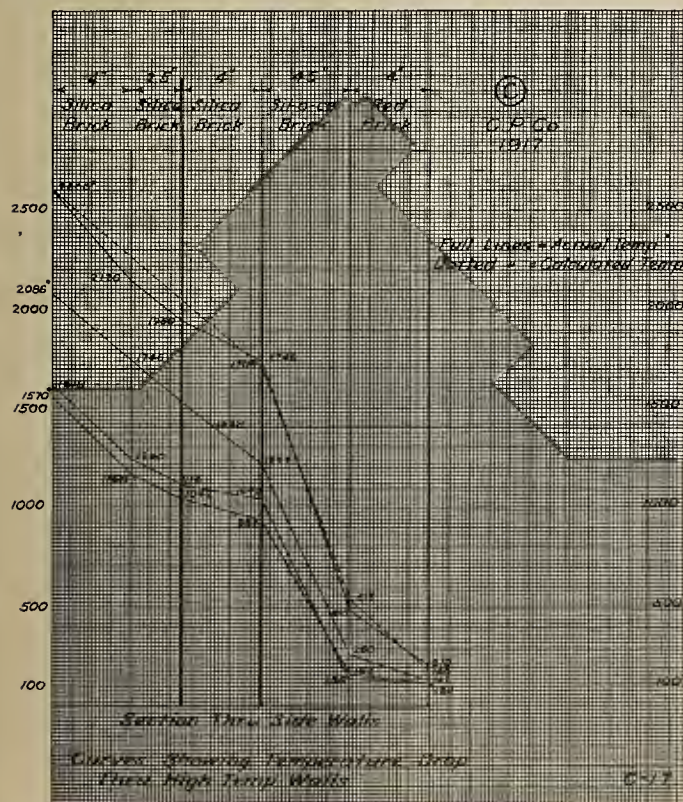
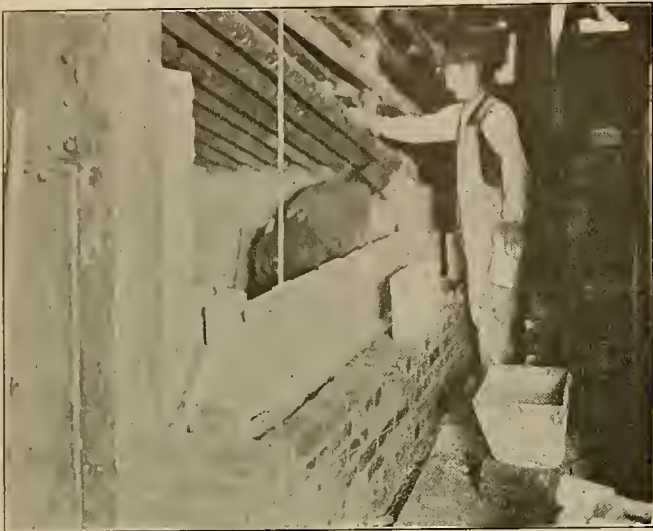


Chart showing the temperature gradient through the different sections of a furnace wall. The full lines represent the actual temperatures and the dotted line the calculated temperatures.

space in furnaces or boilers was considered to be an excellent insulator, until the work of Ray and Kreisinger* demonstrated that at high temperatures

*Bulletins 8 and 12, U. S. Bureau of Mines.

brick. The Sil-O-Cel brick are laid with broken joints in a mortar consisting principally of Sil-O-Cel powder, thus forming a monolithic wall. Bonding is effected by the use of some form of metal wall tie



Side wall of a boiler at the Lake Merced pumping station of the Spring Valley Water Company of San Francisco, illustrating the principle of the core wall construction in insulation.

every fifth or sixth course, or fire brick headers staggered in at suitable intervals, binding the fire brick, insulating brick, and red brick together in a strong wall.

A later development has been the application of Sil-O-Cel brick directly to the outside walls of old boiler settings, where heavy losses occur through both radiation and the infiltration of cold air.

In recent Pacific Coast practice, Sil-O-Cel brick have been stuck to the red brick wall with a sticking cement which forms a bond capable of supporting

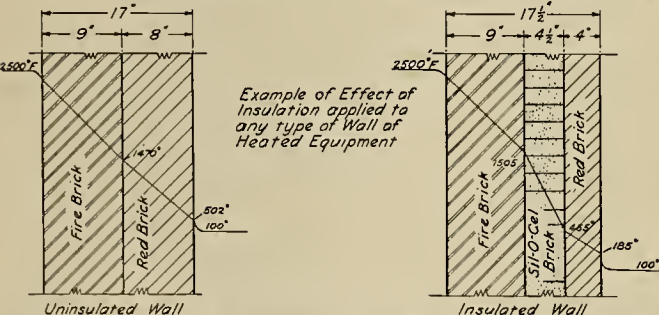


Diagram showing heat flow temperature gradients in insulated and uninsulated walls. The fuel losses per 1000 sq. ft. per hr. of the radiating surface have been shown to be, in the case of oil, 840,000 B.t.u., 5.8 gals., for uninsulated walls, as against 314,000 B.t.u., 2.2 gals., for insulated walls.

the insulating brick, at least until wire ties and tie bolts can be applied. The entire surface is then covered with one-inch 20 gauge wire mesh reinforcement and either plastered with a hard finish cement containing a large proportion of Sil-O-Cel or coated with Celite boiler wall covering. This serves to protect the brick against abrasion and also insures the absolute elimination of infiltration losses.

The same construction is used for the insulation of boiler tops, drums, steam domes, and breechings.

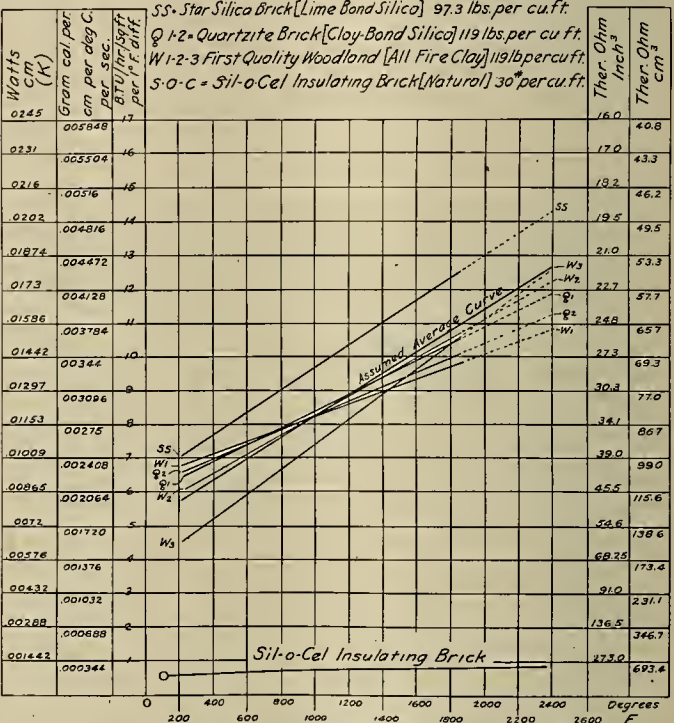
Insulation and Efficiency

In discussing these various installations it would doubtless be desirable to present data on the actual fuel saving resulting from the insulation of individ-

ual boilers. In the case of new boilers, of course, no comparisons are possible, and in the case of old settings, aside from the reluctance of most engineers to commit themselves to a statement of this kind, it frequently happens that other changes are made at the same time the insulation is installed, and it is impossible to tell what proportion of the fuel saving is due to insulation. Furthermore, if such data should become available, it would need to be interpreted with a great deal of caution, due to the number and complexity of the factors involved in the operation of a steam boiler. At any rate, it may be said that proper insulation will eliminate at least 60 per cent of the preventable heat losses through boiler walls.

Moreover, aside from the saving in fuel, the advantages of insulation are so great as to lead to its use by industries, such as lumber manufacturing, where a surplus of waste products is available for the generation of steam.

Insulation makes it unnecessary to overheat the high temperature zones of the furnace; produces throughout the boiler a uniform temperature and



Curves showing the thermal conductivities of brick. The figures for Refractories were taken from B. Dudley, Jr., Trans. American Electrochemical Soc. 1915; for Sil-O-Cel from the Bureau of Standards at the temperature indicated.

even distribution of heat which can be readily controlled by the operator, and prevents sudden fluctuations. This not only results in a more efficient unit from an operating point of view, but also greatly prolongs the life of the setting due to the elimination of strains, with gratifying reductions in maintenance costs.

Insulation also makes it possible to obtain much greater capacity from a given combination of units, often enabling the plant engineer to carry an increased load without the addition of new units.

The fact that the boiler room is uniformly cool and comfortable is an added advantage which cannot be ignored under present labor conditions.

PRACTICAL LESSONS IN ELECTRICITY

BY H. H. BLISS

(Do you know the principle of "stepping up" current from one voltage to another? the effect of self-induction? This article on transformers and induction is the fourteenth of the series on Practical Electricity now being published in connection with the Extension Divisions of the Universities of California and Washington.—The Editor.)

INDUCTION — TRANSFORMERS — INTERPOLES

Induction Coils.—If a coil carrying current is thrust into another coil, an electromotive force will be induced in the latter, due to the cutting of the wires of the second by the lines of force. If the "primary coil" (P, Fig. 1) has an iron core, it will, of course, have a greater flux than otherwise, and so produce the more "interlinkages" of lines of force

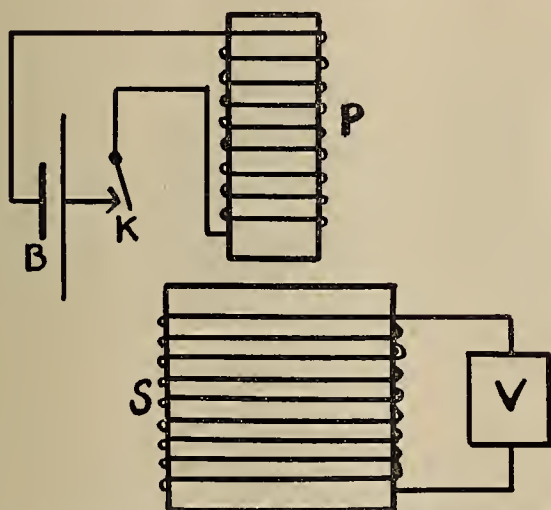


Fig. 1.—The Induction Coil consists of two independent coils with the same core. Varying current in the Primary (P) induces e.m.f. in the secondary (S).

with the turns of wire of the secondary, S. The voltage set up is proportional to the number of interlinkages (number of lines by number of secondary turns) and the quickness with which they are produced — one volt if the rate is 100,000,000 per second. Leaving the primary standing within the secondary induces no voltage, and the needle of the voltmeter stays at zero. But breaking the primary circuit at K produces the same effect as withdrawing coil P, destroying the interlinkages and moving the voltmeter pointer in the negative direction. Closing K sets up the linkages and gives a positive indication on V. Thus we obtain an alternating current in S by starting and stopping the primary direct current, but we get no effect with a steady primary current when the coils are stationary.

If we replace K by a telephone transmitter, any sound near it will cause motion of the diaphragm, with consequent variation in the resistance of the instrument. When the primary current rises, it increases the flux and sends current in one direction through the secondary circuit; when it decreases it produces secondary current in the opposite direction. The apparatus (P and S) thus used constitutes the

"induction coil" found in every telephone circuit. The ordinary induction coil, used to shock people for the betterment of their health or to produce sparks for ignition and wireless telegraphy, consists of the primary and secondary coils and some apparatus for suddenly opening and closing the circuit at K.

Transformers.—When alternating current is supplied to the primary coil, the apparatus becomes a "transformer." The flux produced by the primary and linking with the secondary is directed first one way and then the other as the supply current flows forward and backward. Every time the flux comes to a maximum and commences to decrease, the secondary voltage stops and reverses. Thus is obtained an alternating e.m.f. of the same "frequency" (number of cycles per second) as the primary current.

The ratio of the induced voltage to the pressure applied to the transformer is almost exactly the same as the ratio of secondary to primary turns. Under operating conditions the secondary voltage is a little lower than is indicated by this relation, on account of drop due to resistance and the "leakage" of part of the flux (some lines are produced by one coil and fail to link with the other).

Iron cores are used in induction coils and transformers, the latter usually having a complete iron path for the flux, while the former have "open cores" which are merely straight bars of iron. Of course the laminated construction must be used for all cores carrying an alternate flux, to prevent undue losses by eddy currents.

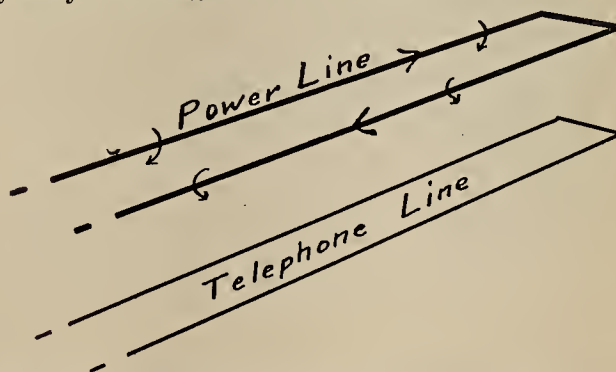


Fig. 2.—At one instant the current and magnetic lines of the power circuit are as indicated. When they reverse, the lines which reach the telephone wires induce a voltage there.

Whether or not iron cores are used, the changing flux due to varying current in one circuit will set up an alternating e.m.f. in any other circuit with which the lines become linked. Thus the apparatus of Fig. 1 will give evidence of a small effect on V, even if the coils are separated as shown and contain only an air core.

This "mutual induction" is often troublesome. Coils near together on a telephone switchboard used to affect one another and produce "cross talk" until each coil was surrounded by an iron case which kept the flux from straying. In a telephone line near an a.c. power circuit (Fig. 2) alternating currents are induced by the lines of force which link with the telephone wires. It is to overcome mutual induction that the conductors of power lines and telephone systems are crossed over each other or "transposed" at intervals.

Self Induction.—Flux set up by a coil links first of all with the wires of that coil, and this interlinking produces inductive effects similar in principle to those of mutual induction. When K is opened (Fig. 1) a spark appears there, more evident if there

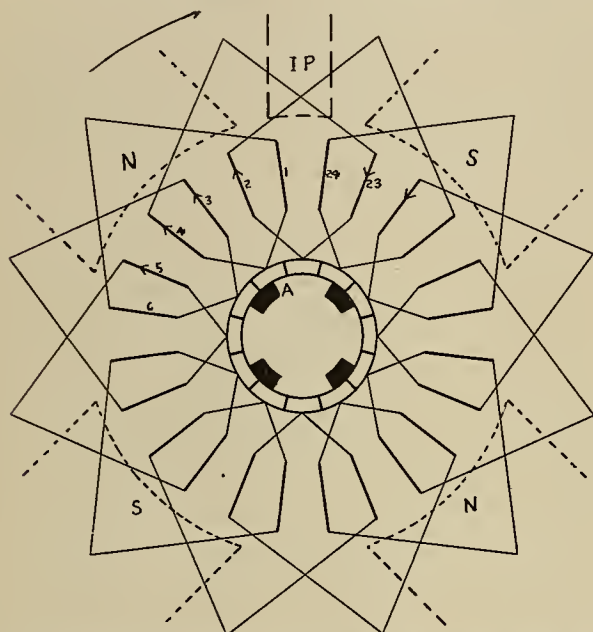


Fig. 3.—Four pole d.c. generator armature. The heavy radial lines numbered 1, 2, 3, etc., represent the inductors. To avoid confusion the brushes are drawn inside the commutator.

is an iron core in the coil. A voltage is induced by the change of linkages, and this may be far higher than the battery voltage. Indeed, one may obtain a very perceptible shock with a small electromagnet (such as that in an electric door bell) and a single dry cell.

The voltage induced by the cutting down of battery current and consequent reduction of linkages is, naturally, so directed as to oppose this diminution of current. Thus the current is kept flowing through the increasing resistance of the opening key, crossing the air gap in a spark or arc. The faster the gap is opened the greater the voltage induced.

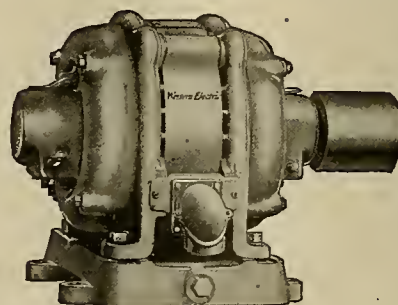
Low speed gas engines sometimes have the "make and break" spark for ignition. A pair of contacts inside the cylinder are caused to touch, and current flows from a battery through a coil of high "self inductance" (having an iron core and many turns of wire). When the circuit is suddenly broken, a spark jumps across the break and ignites the explosive charge. A similar device is used for lighting gas lamps and stoves.

When an electromotive force is applied to a cir-

cuit containing self induction, the current grows but slowly, for the increasing interlinkages induce a counter voltage. An alternating e.m.f. sends through an inductive coil a current which is small compared with what it could send through an equal non-inductive resistance, because the voltage begins to decrease before the current has time to rise much. Furthermore, the voltage falls to zero and reverses some time before the current does. Such a current is said to be "lagging," and in these cases the power factor is less than 100%. Small induction motors often take current lagging so much that the power factor is 80% or less.

Commutation.—Fig. 3 represents a four pole d.c. generator at the instant when each of the brushes touches two commutator bars. The coil including inductors numbered 1 and 6 is short circuited by brush A at this time. Just before the brush touched the left hand bar, current was flowing in inductor No. 1 the same way as in Nos. 2 and 3; an instant later, when brush A no longer touches the right hand bar, current must flow the opposite way in No. 1, for it will then be under the south pole. The current in the coil must stop and reverse in the time it takes a commutator segment to pass across the face of one brush—possibly 1/500 sec. in an ordinary machine.

Self induction keeps the current flowing in the coil after it is short circuited, thus producing heat and making trouble at the face of the brush. To remedy this an "interpole" (IP, Fig. 3) may be placed between the main poles. The flux it produces must be enough to overcome the magnetizing effect of armature reaction and in addition induce in the short circuited coil a voltage opposing the e.m.f. of self induction and assisting the starting of current in the new direction. The interpole winding is con-



In this Induction Motor the alternating current in the primary winding is choked down to a safe value by self-inductance. Short circuited currents are induced in the rotor by what resembles transformer action.

nected in series with the armature and hence its strength is proportional to the armature current.

The interpole shown should have south polarity, to prepare the inductors for the south pole they are about to reach. Three more interpoles would be used, one in each gap between main poles, and each of the same polarity as the main pole which follows it.

On motors interpoles are much used also. Here each one has the same polarity as the main pole which an inductor passes before it reaches the interpole.

Sources of Power for California Railroad Electrification

BY F. H. FOWLER AND ROBERT SIBLEY

(Electrification of steam railways, especially over mountain grades, is a subject of vast importance to the nation at large, and to the electrical engineer it has a special message at this period when engineers generally are looking afield to see how they may the better participate in broad questions of the hour. Extended announcement was made in the Journal of Electricity July 15, 1919, page 72, of an important investigation now under way in the West on this timely subject. Mr. Fowler is hydroelectric engineer of the Forest Service and Mr. Sibley is editor of the Journal of Electricity.—The Editor.)

In presenting the following report to the committee on Railway Electrification appointed by the San Francisco Section, A. I. E. E., the sub-committee on Hydroelectric Power wishes to make it clear that



Tuolumne river will furnish not only the municipal water supply for San Francisco but a large amount of electric power. This view is taken from Lambert Dome, looking westward over Tuolumne Meadows. Photo by W. L. Huber.

the information contained therein is of a preliminary nature, and that the final figures may differ from those here given. It has been the aim of the committee, however, to make all estimates conservative, and final estimates of power at commercially feasible sites will, therefore, probably be in excess of those given in Tables 2, 3 and 4.

Proposed California Electrifications

For the basis of classification in the following pages, the three mountain divisions for which electrification is proposed in the near future will be designated:

- A. Siskiyou Electrification
- B. Sierra Electrification
- C. Tehachapi Electrification

The most readily available figures covering the physical characteristics of these three divisions, as

well as the most recent estimates of tonnage hauled over the lines and electric power necessary to handle the traffic are given in a report prepared by Mr. W. F. Dietrich, Engineer, Oil Division, U. S. Fuel Administration, and submitted to Mr. D. M. Folsom, Federal Oil Director for the Pacific Coast, September 27, 1918. The data from this paper, which have already been presented before the American Institute of Electrical Engineers, are summarized in Table 1.

The Committee wishes to express its thanks to Mr. W. L. Huber, Civil Engineer, San Francisco, for the use of photographs of several important power streams.



On this map is indicated the railroad electrification proposed as a war measure by the U. S. Fuel Administration. The plan outlined in the report would extend electrification as far south as Saugus.

TABLE I.—CONDENSED PHYSICAL AND OPERATING DATA FOR PROPOSED CALIFORNIA ELECTRIFICATIONS

	Siskiyou	Sierra	Tehachapi
Location	Gerber, Cal., to Ashland, Ore.	Roseville, Cal., to Sparks, Nev.	Bakersfield to Saugus
Length	215 miles	139 miles	138 miles
Range of Elevation	244' to 4113' ¹	163' to 7018'	414' to 4025' ²
Traffic	2,875,000 tons North	4,700,000 tons East	6,120,000 South—Bakersfield to Mojave 3,145,000 South—Mojave to Saugus
Freight ³	2,040,000 tons South	3,900,000 tons West	2,065,000 North—Saugus to Mojave 4,020,000 North—Mojave to Bakersfield
Passenger ⁴	3,000 tons each way per day	3,600 tons each way per day	3420 tons Bakersfield-Mojave 2750 tons Mojave-Saugus
Power required per year.....	73,200,000 kw-hr.	104,200,000 kw-hr.	89,000,000 kw-hr.
Average demand	8,350 kw.	11,900 kw.	10,150 kw.
Load factor	25%	25%	25%
Maximum demand	33,400 kw.	47,600 kw.	40,600 kw.

¹Elevations at critical points on the line are Gerber 244, Summit 3904, Klamath River 2156, Siskiyou 4113, Ashland 1172.
²Elevations at critical points on the line are Bakersfield 414, Summit 4025, Mojave 2745, Rosamond 2318, Vincent 3210, Saugus 1165.

³Trailing tonnage, 1917, from records of operating companies.
⁴Estimated future tonnage.

Sources of Power—Siskiyou Electrification

An inspection of the map of this region shows that the line included in the Siskiyou electrification crosses at nearly right angles the streams that would furnish the most readily available hydroelectric power. These are Rogue, Klamath and Pit rivers, with a supplementary supply from the already developed sites on Cow and Battle creeks. Although the line traverses the course of the Sacramento river, the latter does not appear to offer an effective source of energy, since extensive development on this stream



Kern river is one of the streams that is being harnessed and can furnish power for the Tehachapi electrification. This view, taken across Kern lake, shows the canyon extending northward toward Mt. Whitney. Photo by W. L. Huber.

would probably interfere with the established grade of the railroad. Klamath and Rogue rivers offer ample power supplies for the northern part of the line. The development of these streams for railway electrification is made more attractive by the fact that while they are remote from present load centers they are exceptionally well situated with reference to the railroad. On Pit river and streams to the south of it, the best sites are already in the hands of various hydroelectric operating companies, but these companies would be well able to handle the railroad load with very short extensions and reinforcements to their present transmission system. In fact, the entire length of the division proposed for electrification is now paralleled more or less closely by hydroelectric transmission lines. The railway could develop its own power at the numerous undeveloped sites on Klamath river, but will probably find it commercially advantageous to purchase power from one or more of the hydroelectric companies.

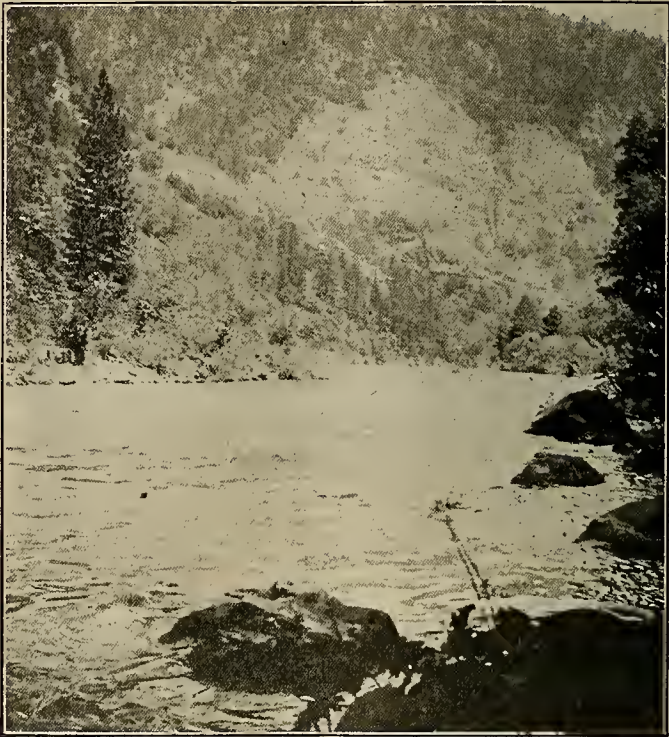
To supply this and other demands, the following commercially feasible water powers are available:

TABLE 2.—SOURCES OF HYDROELECTRIC POWER AVAILABLE FOR SISKIYOU ELECTRIFICATION

STREAMS	Installed Capacity—Kva.	
	Plants in operation	Undeveloped sites
Rogue river	6,700	No estimates
Klamath river	16,450	200,000
Pit river		280,000
Cow and Battle creeks.....	36,150	.....
Total,	59,300	480,000

Sources of Power—Sierra Electrification

This division parallels the American and Yuba rivers west of the summit, and the Truckee river east of the summit. All of these streams are now partly developed for commercial use. The transmission map of California shows the electrified zone to be centrally located with reference to the transmission lines of the large interconnected systems of central California. It would, therefore, appear very advantageous for the railway to purchase from the operating utilities. It is probable power will be supplied eventually from plants located on Butte creek and Feather, Yuba, Bear, American, Mokelumne, Stanislaus and Tuolumne rivers west of the summit,



View in the Pit river Canyon. The line included in the Siskiyou electrification would cross this stream as well as the Rogue and Klamath rivers. All these are now partially developed for commercial use.

and Truckee and Carson rivers east of the summit; minor streams not being considered. The most attractive sites are held by operating concerns, although there are a few which might be developed purely as a railway supply, but probably at a rather high unit cost.

TABLE 3.—SOURCES OF HYDROELECTRIC POWER AVAILABLE FOR SIERRA ELECTRIFICATION

STREAMS	Installed Capacity—Kva.	
	Plants in operation	Undeveloped sites
Butte creek and West Branch of		
Feather river	22,200	.....
North Fork of Feather river.....	65,800	470,000
North and South Yuba.....	75,450	120,000
South American	8,625	20,000
Mokelumne	20,000	.....
Stanislaus	37,375	60,000
Tuolumne	3,900	75,000
Truckee	9,200	.....
Total,	242,550	745,000

Sources of Power—Tehachapi Electrification

The railway leaves the most southern of the Sierran streams—Kern river—at Bakersfield. Operation of the electrified zone would depend upon water power on the streams from Kern river north to the San Joaquin west of the mountains, and in the

THE San Joaquin River is one of the sources of power available for Tehachapi electrification.

This view is on the South Fork, a short distance above Blaney Meadows, near where the Southern California Edison Company will divert through a long tunnel into Huntington Lake in the Big Creek system.



Owens and Mono lake basins east of the range. Here again, as in the central Sierra, the best available sources are in the control of operating companies. It appears that it would be highly desirable, if not absolutely necessary, for the railway companies to purchase power from one or more of the electric utilities, or from the Los Angeles municipal system.

The division from Saugus to Bakersfield, shown in column 4, Table 1, has been studied in detail with a view to electrification. It appears probable, however, that the Southern Pacific will extend the electrified zone from Saugus to Los Angeles and that the Santa Fe will electrify from Mojave to Barstow. Once having electrified as far as Barstow from either east or west, the Santa Fe would undoubtedly find it advisable to electrify southward through the Cajon Pass to San Bernardino, and this extension having been completed, two or more of the lines now operating between the San Bernardino district and Los Angeles would probably find it to their mutual advantage to join forces in closing the gap, thus giving a loop from Los Angeles through Mojave, Barstow and San Bernardino back to Los Angeles, with branches extending northward from Mojave to Bakersfield, and eastward from Barstow through Arizona.

To supply this railway electrification and other demands, the following water powers are available, exclusive of the Colorado river:

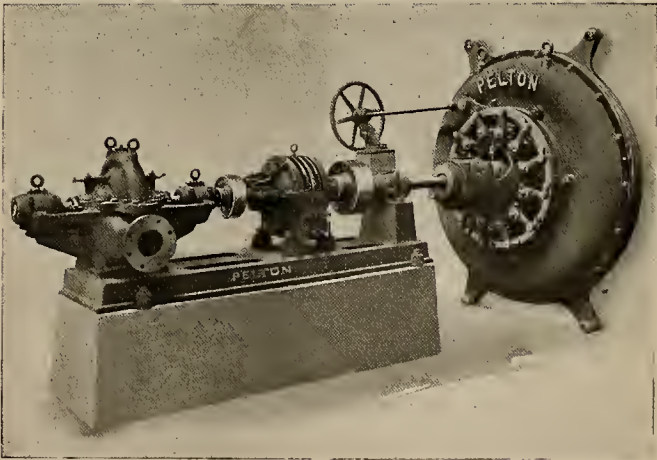
TABLE 4.—SOURCES OF HYDROELECTRIC POWER AVAILABLE FOR TEHACHAPI ELECTRIFICATION

STREAMS	Installed Capacity—Kva.	
	Plants in operation	Undeveloped sites
San Joaquin river	92,425	500,000
Kings river .....	.....	100,000
Kaweah river	6,850	.....
Tule river	8,500	.....
Kern river	31,350	110,000
Owens river and Los Angeles aqueduct	57,530	150,000
Mono lake	13,000	10,000
Total,	209,655	870,000

The transmission lines already constructed are well arranged to supply the possible demand of both eastern and western branches as well as the southern end of the electrified zone, through steel tower transmission lines already in commercial operation. It would be necessary to reinforce or slightly rearrange

some of these lines, but in most cases the electric systems have already provided rights of way necessary for such new construction, and would be able to supply power in any necessary quantities by the time that the railroads had equipped their tracks for electrical operation.

This report, as already stated, is merely preliminary, but from all information now at hand it appears that there is an ample potential supply of hydroelectric energy, over and above other power demands of the state, readily available for the electrification of the three proposed divisions.



Irrigation pumping unit

ALL-HYDRAULIC PUMP IN IRRIGATION

An interesting all-hydraulic pumping unit has recently been put into operation, on the Snipes Mountain Irrigation District, Washington, for elevating water to a section of the district which can not be reached by the gravity flow. The pumping unit consists of a Pelton reaction turbine operating at slow speed under a low head, connected through gears to a high speed, high head Pelton centrifugal pump. Maximum input to the turbine is 25 second feet, under a working head of 20.5 feet, while the total pumping head is 115 feet. Water for both the pump and turbine comes from the main irrigating stream, the pump discharging into a 1000-ft. pipe line, rising to the higher elevation.

The New Physics

(Of especial interest to those who wish to keep up to date in electrical theory is the announcement of a series of articles on "The New Physics" by Dr. A. C. Crehore. A brief glance at the outline of the general scope of the articles as presented below will indicate the importance of the discoveries announced and the new theories presented.—The Editor.)

The electrical engineer who fails to keep up to date with the latest theories and advances of his science is in the position of the doctor who is satisfied with his subject as he learned it in medical school. The last few years have brought forth startling modifications of the atomic theory and closer calculations of many physical relationships which may have a profound effect on the practical applications of electricity.

It is the privilege of the Journal of Electricity to present a series of articles on "The New Physics" by Dr. A. C. Crehore, beginning with the November 15th issue of the Journal of Electricity. Dr. Crehore is well known as the author of several text books on Physics and his recent book "The New Atom" has caused great interest in scientific circles.

In these articles he presents new expressions for Rydberg's constant and Planck's constant, connecting them in various ways with the electrical charge and the mass of the nucleus of the hydrogen atom. The two systems of units, the electrostatic system and the electromagnetic system, are reduced to one common system in terms of length and time.

A conception of the scope of this series and their importance in bringing the understanding of electricity one step closer is to be judged from the following brief summary of the contents of the articles:

CONTENTS

1.—Fundamental conceptions and laws that have led to the so-called electrostatic and the electromagnetic systems of units. The meaning of the dimensions of units. The dimensions of specific inductive capacity and of magnetic permeability in terms of length and of time.

2.—The measured ratio between the magnitudes of the units for the same kinds of quantities on the electrostatic system and the electromagnetic system equal to some power of the velocity of light. Dimensions of the product of specific inductive capacity and magnetic permeability due to Maxwell's theory. Table of dimensions of units in terms of L and T only, without k and μ . Table of dimensions of units in terms of length and time only, the space-time system, mass, specific inductive capacity and magnetic permeability having been eliminated.

3.—Reasons for making specific inductive capacity the reciprocal of a velocity. The J. J. Thomson atomic model. The Rutherford atomic model. The "solid electron" of Lorentz. Great importance of the mass formula for the Lorentz electron. Rutherford atomic theory supported by the Lorentz mass formula. Reflections on electromagnetic theory, in its past form, its present form, and probable future form. The dimensions of the Lorentz mass formula. Custom of omitting to write specific inductance capacity in all electromagnetic equations must be changed. Common form of writing the Lorentz mass formula incorrect. The mass formula corrected by introducing the specific inductive capacity. New value for the Rydberg constant derived from the Lorentz mass formula. This gives an accurate numerical value of e^2/m_H . Radius of the nucleus of the hydrogen atom depends upon the Rydberg constant. Electro-chemical equivalent gives an accurate value of e/m_H . Coupling this with the previous value of e^2/m_H gives an accurate numerical value of the charge on the electron, e . It also gives an accurate value of the mass of the hydrogen atom, m_H . Combining this value of e with the Bucherer ratio of e to cm , gives an accurate value of the mass of the electron, m_e .

4.—Reasons for making mass have the dimensions of a velocity, LT^{-1} . First, a new expression has been found for Planck's constant, h , which demands that mass shall have the dimensions of a velocity. Second, the gravitational theory of

the author makes the same demand. Meaning of the constant, h . The formula of Einstein experimentally established by Millikan. His experimental value of h from this work is 6.56×10^{-27} . The new theoretical expression for h makes it depend upon the numerical values of the velocity of light and Rydberg's constant only. It is given three different and equivalent forms. The theoretical numerical value of h is 6.558×10^{-27} , very close to Millikan's experimental result. New units of length and time considered, different from the centimeter and the second. Unit of time chosen is the time of one revolution of the electrons in the hydrogen atom. New unit of length is the distance traveled by light during one revolution of the electrons. Velocity of light on this system becomes unity. Twice the Rydberg constant becomes unity. The specific inductive capacity becomes numerically equal to the velocity of light in the C.G.S. system. The units of mass and of energy are large by comparison with the old units. The square of the charge of one electron numerically equal to the mass of the hydrogen atom, but not dimensionally. The mass of the hydrogen atom numerically equal to its energy content, but not dimensionally. The constant h depends upon the specific inductive capacity alone, that is upon the velocity of light alone numerically, but not dimensionally. To omit to express the specific inductive capacity in common formulae is analogous to the omission to express the velocity of light and twice the Rydberg constant on the new system of units. The absurdity of omitting any of these quantities is made apparent by considering the new system of units.

5.—Second reason for making mass the equivalent of a velocity. The gravitational equation. This demands that the dimensions of mass multiplied by specific inductive capacity shall vanish. This condition satisfied by making mass have the dimensions of a velocity.

6.—The gravitational equation applied to bodies of gross matter. The velocities of electrons in rings of p electrons. A new value for the gravitational constant in terms of e , h and m_e only.

7.—Two equivalent expressions for the mass of a body of gross matter. One derived from the weight, and the other from the masses of the nuclei, equivalent to each other. Mass of a body of gross matter depends upon the total kinetic energy of translational motion of the electrons. Mass and weight to be carefully distinguished.

8.—Deductions from the gravitational formula. The weights of rings of electrons. Discussion of electromagnetic theory as applied to rings of electrons. It seems probable that a new electromagnetic theory will give a definite solution of the velocity of the electrons in a ring. If we can assume the Doppler factor sensibly equal to unity, it gives a definite solution in its present form, but probably with incorrect numerical values. Table of combinations of rings of electrons that make up the weights of atoms very exactly. Great excess in the number of rings of four electrons in this table. This matter can be tested by the gravitational equation. The average speed of an electron in the earth very nearly the same as the speed in a ring of four electrons.

9.—The result obtained for the earth is general for any bodies composed of mixed matter, the planets, sun, etc. Example of a hydrogen star. Example of a helium star. Hydrogen an exception, and helium typical of all other kinds of matter. Derivation of the Avogadro constant. The proposition that rings of four electrons greatly preponderate in most kinds of matter, hydrogen excepted, established.

10.—The source of the gravitational equation more fully discussed. It shows that the attraction between cubic crystals is independent of the orientation of their axes.

11.—Discussion of the gravitational equation continued. It is derived from the Lorentz electromagnetic theory in part. This is required to be modified because of the incorrect dimensions. It must also be modified to conform to the law of equal action and reaction. Criticism of G. A. Schott considered. The new electromagnetic theory of Maga Nad Saha, based upon the generalized Minkowski space.

12.—Brief account of the author's theory of the atom. The lines in a spectrum due to the paths described by the electrons when they are disturbed from their normal circular orbits. Theory supported by electromagnetic theory. Theoretical ionizing voltages in hydrogen agree with the experimental values very closely. The Bohr atomic theory does not give the correct ionizing voltages.

Employee Participation as a Central Station Answer

BY R. H. BALLARD

(A united company organization is the strongest bulwark of the public utility. The value of employe as well as customer ownership has been recognized by Western companies in several recent financial campaigns during which large blocks of company stock have passed into the hands of the utility employes. Foremost among these progressive organizations has been the Southern California Edison Company. The author is well known as vice-president of this company as well as president of the N. E. L. A.—The Editor.)

Participation by employes, and the possibility of the workers becoming substantial owners in our industries, is becoming an established and recognized fact in the industrial life of America.

The Justice of the Employe's Position

In the clamor arising from loud voices and isolated disturbances, we may not realize it, but we are already in a new era, the era of participation by the worker in the business at which he works, and participation is the antidote to anarchy.

Enduring benefits resulting from the participation of workers in the business in which they are engaged can not go beyond the sharing of profits or earnings. To place the management of the industries in the control of those untrained in the administration of such affairs would result in disaster, frustrating the very ends which cooperation is seeking to achieve.

Not All Managers

The managers of our great enterprises are the results of the natural process of selection of the fittest. In our industrial life there is continuously in progress the quest for the best managers, and it naturally follows that those in charge of the management of these concerns are business and financial experts. The most highly skilled artisan, specializing in his particular art, is often pitifully ignorant of business even in its most elemental form. Too frequently the thrifty industrious workers have been the prey of financial charlatans. Statistics compiled by the banking houses of the United States show that nearly 90% of the men of our country are penniless and dependent at the age of sixty, which is conclusive evidence that the artisan is not a successful business man.

A Practical Plan

So rapid has been the spread of the cooperative thought that today the majority of our large concerns have some plan by which the workers can become part owners and profit sharers in the business. No general plan or universal scheme of participation is possible or practical for the reason that the condition of no two undertakings is identical. We are dealing with a principle, therefore the hundreds, perhaps thousands of plans adapted to making the principle effective in its many applications, become subordinate to the place of detail; but the plan which has been most effective in practice provides for the purchase by employes on small installments of capital stock or securities of the properties with which they are identified, giving the employe an opportunity to buy substantial holdings without seriously impinging upon his wage. The interest on the deferred payments is carried by the concern at ordinary interest rates, but the employe receives divi-

dends at a higher rate in proportion to the earnings of the property, and consequently acquires a vital interest in the success of the business.

Studying the financial reports, attending the meetings of stockholders and becoming fully cognizant of all of the conditions affecting the business, the employe knows the process of production, the cost of material, the point the payroll can reach without increasing the cost of the product above the market prices, or decreasing the dividends below the point where the stock will attract purchasers for additional development of the business.

The Benefits to be Expected

Our constructive problem seems to shape itself along this line: Can the millions of workers in the United States be gradually brought into a partnership in the business which employs them? From the thirty billion dollars which they annually earn, can a substantial portion of the surplus over living expenses be directly invested in the various activities in which they are engaged, so that the increment of their savings can be unified with the work and intelligence of their lives? Then they would reap the full reward of their labor and their accruing capital. When we consider that wage payments are a large part of the fifty billion dollar annual turnover of business in this country, the possibility of workers becoming substantial owners in our industries does not appear impracticable or unapproachably remote.

Mutual interest is the basis of every enduring human structure. We cannot kill unhappiness, discontent and unrest with censorship, the sword or the machine gun, because they are ideas.

In the cooperative business family of the new era, we find every individual actuated by the desire to help the others, because the stronger and better the units, the better the organizations. Enduring fraternal relations are bound to exist. Opportunities to educate the workers to the highest degree of efficiency in the technique of their crafts are scientifically pursued and result in the developing of the highest qualifications. One of the greatest features of the cooperative industrial era is providing pensions in the form of deferred payments for the retirement of workers on substantial incomes when the evening of life approaches, and for disability benefits to those who have served well, but may have become disqualified for service.

To make participation the great dominating factor underlying all forms of labor requires no law tinkering or readjustment—we are doing it, and all we have to do is to keep on extending it until it absorbs every industrious worker in its comprehensive plan. The code is the common law and the square deal.

SPARKS—Current Facts, Figures and Fancy

(Speed is somehow very conspicuous in this collection of curiosities for the curious. There is a proposed 2½-day air service from London to New York, a speed-up method of paying street car fares, a lightning system of trouble hunting round the Panama Canal, and a rather disconcerting item about the solar system. We always knew that India grew serpents, but it seems that it has another resemblance to the Garden of Eden in the form of a dangerous tree.—The Editor.)

A federation of brain workers on trade union lines was discussed at a recent conference in Europe. A strike suspending all cerebation is a rather alluring possibility conjured up by this suggestion.

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During the month of June this year the number of persons leaving the United States for Europe averaged 1,000 per day. These consisted chiefly of people from the laboring classes, the greater number going back for good.

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The flowers of the mahua tree, common in various parts of India, are said to yield 90 gallons of 95% alcohol per ton. To forestall interested correspondents we will add that we have no information as to whether or not the tree can be transplanted.

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The number of telephones per 1000 inhabitants in 1918 was approximately 130 in the United States and 19 in Great Britain. Development was arrested in Great Britain by the outbreak of the war in 1914, but in the United States it proceeded very rapidly up to 1917.

* * *

The pay-as-you-leave system for street-car service has been inaugurated by a western company to relieve congestion and save time in the down town districts. The system has proved eminently successful so far, and no complaints have been received from conductors.

* * *

The electrical equipment on board one of the newest United States dreadnaughts would provide lighting and power for a city of 10,000 inhabitants. The ship's searchlights are so powerful that on the darkest night one could read a newspaper by their light at a distance of fifteen miles.

* * *

In the Panama Canal Zone airplanes are now used for trouble-hunting along the telegraph lines. A flier recently went to repair a break fifty miles away, and was back again with the job completed in one hour and fifty minutes. Traveling in the ordinary way, by horseback over jungle trails, he would have been gone three days.

* * *

A ship safety device recently invented is said to register, through sound waves, a sounding of the depth of water under a ship's keel, and to give warning of the bearing and distance of any approaching craft. Registering apparatus is placed on the bridge or in the chart house and electrically connected with sound-receiving discs on the ship's bottom, sides and bows.

An arrangement which, when perfected, will allow of the safe landing of aeroplanes in darkness or fog consists of a coil of wire, wound on the lower wing, in which a feeble current is set up by means of an apparatus at the landing field. The current is transformed by a very sensitive amplifier into a telephone signal, the intensity of the signal increasing as the plane nears the center of the field.

* * *

The idea of the serenity of the universe as contrasted with the feverish activity of humans loses its appeal when we are told that the solar system, in addition to revolving, is hurrying through space at the rate of 63,000 feet a second. Someone has calculated that an artillery shell with the velocity of the solar system through space would penetrate a sheet of steel four city blocks thick.

* * *

Norwegian fishermen are using a species of submarine telephone to aid them in their work. A microphone is lowered from a fishing boat and connected by a wire to a telephone in the boat. The fisherman listens at the instrument and when the fish hold a meeting the listening device records the disturbance. The boat is then steered in the direction from which the sounds come, and the shoal is located.

* * *

A British combine proposes to put into execution a world-embracing plan for passenger airship transportation. Routes have been planned so that no important city will be over ten days' air journey from London. The trip from London to New York is to take 2½ days, and from London to San Francisco 4½ days. The schedule between London and Cairo will make it possible for the tired business man to go to Egypt for a week end.

* * *

Wireless telegraphy is shortly to be applied to a longitude determination of a complete circle of the globe. Three places have been chosen almost equidistant—Paris, Shanghai, and San Francisco—each separated from any one of the other two by approximately one-third of the earth's circumference. Accurate clocks at these places will be compared by means of wireless signals from three other places—Annapolis, Honolulu, and a French station are suggested—and as 15° of longitude are equal to an hour's time difference, the instantaneous comparison of the clocks at the three places selected for the experiment will enable the differences of longitude to be accurately calculated.

PERSONALS

Chas. H. Lee, recently Captain of Engineers in charge of water investigations in the allied territory among the expeditionary forces, has been appointed President of the California Water Commission. Mr. Lee comes to his new position with unusually high qualifications for the new office. After graduating from the civil engineering department of the University of California with the class of 1905 he went with the engineering force engaged in constructing the Los Angeles Aqueduct. Here his careful and accurate investigations



of precipitation in the High Sierras won for himself a national reputation and added greatly to our present knowledge in regard to the laws of precipitation and run-off in high altitudes, much of which information appeared in former issues of the Journal of Electricity. Governor Stephens is to be congratulated upon his excellent selection for the new member of the Water Commission.

J. T. Huntoon, electrical engineer of Sacramento, is a recent visitor to San Francisco.

Allen Hazen, a well known consulting engineer of New York City, is a recent San Francisco visitor.

Geo. R. Purvis, assistant to the president of the Hurley Machine Company, is visiting San Francisco.

R. C. W. Libbey, representative of the Simplex Electric Heating Company, is visiting the Pacific Coast.

C. G. A. Baker, of the Baker-Joslyn Company, has returned to San Francisco after spending some time in Seattle.

J. H. Parker of J. H. Parker, Inc., insulator manufacturers, has returned to Parkersburg, W. Va., after visiting the Pacific Coast.

Harris J. Ryan, professor of electrical engineering at Stanford University, after a year's leave of absence is back again with his classes at Stanford.

W. E. Jones, district manager for the Economy Fuse Manufacturing Company, Seattle, is visiting the distributing offices of the company at Salt Lake and Denver.

J. P. Felton, supply department manager of the Boston office of the General Electric Company, with Mrs. Felton is touring the Pacific Coast and recently spent some time in San Francisco.

Paul Lincoln, commercial manager for the Westinghouse Electric & Manufacturing Company and a past president of the American Institute of Electrical Engineers, is a recent San Francisco visitor.

Edmund E. Walker, general manager of the British Columbian Electric Company of Vancouver, B. C., was an interested attendant at the recent Seattle convention of the Northwest Electric Light and Power Association.

R. F. Behan has resigned from the San Francisco sales organization of the John A. Roebling Sons' Company to open up an automobile repair shop at 14th and Mission streets, San Francisco, under the name of Behan & Regalia.

John H. Anderton, chief electrical engineer of Stone & Webster with headquarters in Boston, Mass., is a recent Los Angeles visitor, where he attended the Pacific Coast Convention of the American Institute of Electrical Engineers.

Captain Norwood Brackett, of the Puget Sound Traction Light & Power Company, was the recipient of many congrat-

ulations over his thrilling description of war experiences in France as narrated at the banquet during the recent Seattle convention of the Northwest Electric Light and Power Association.

Percy H. Booth, Pacific Coast advertising manager of the Edison Electric Appliance Company with headquarters at Ontario, California, and P. L. Miles of the Chicago office of the company are recent business visitors in Portland and Seattle.

Charles M. Masson, of the Southern California Edison Company, Los Angeles, has been designated to represent the Pacific Coast Section, N. E. L. A., at the national convention of the Society of Illuminating Engineers, in Chicago, October 20th to 23rd.

Captain W. B. Mel, of the Coast Artillery Corps, has returned to San Francisco from France after a fifteen months' service with the expeditionary forces. Captain Mel was formerly in the valuation department of the Pacific Gas & Electric Company.

Chas. H. Delany, steam power plant specialist for the Pacific Gas & Electric Company, is again in his San Francisco office after a business trip to New York and Boston covering several weeks' duration, where he delivered a paper on fuel oil and its uses.

C. Kirk Hillman, of the newly incorporated Hillman Engineering and Sales Company at Seattle, is to leave for the Orient with his family soon, to spend a year in Japan, China, Manchuria and other countries for the purpose of studying trade conditions.

N. Asano, electrical engineer, recently returned to San Francisco on his way back to Japan after a two months' tour of the United States. Mr. Asano has been making a study of improvements in electrical appliances and has visited many plants in this country.

Frank D. Fagan, Pacific Coast sales manager of the Edison Lamp Works, acted as chairman at the opening of the California Industries and Land Show at the San Francisco Civic Auditorium, introducing Mayor James Rolph, Luther Burbank and other notables.

W. L. Frost, general agent with the Southern California Edison Company, has accepted the chairmanship of the program committee of the Electrical Cooperative League of Los Angeles, R. J. McHugh, announced in our last issue as holding that position, having resigned.

D. C. Henry, consulting hydraulic engineer of Portland, Ore., has been made chairman of the Oregon committee to aid in carrying out the plans of the recent conference of engineers, architects and constructors in connection with the creation of a department of public works.

L. N. Robinson, associate professor of electrical engineering at the University of California, is on a year's leave of absence during which period he is engaging in practical work with the Stone & Webster Company in the construction of the Caribou plant of the Great Western Power Company.

Lewis A. McArthur, general manager of the Pacific Power & Light Company, with headquarters at Portland, Oregon, is a recent San Francisco visitor. Mr. McArthur purchased a new automobile in San Francisco and enjoyed a delightful trip overland through northern California back to his home in Portland.

Frank J. Somers of the Century Electric Company, San Jose, is confined to his home through illness, due to high blood-pressure. Mr. Somers is a former president of the California Association of Electrical Contractors and Dealers, and his many friends in the industry are hoping for his speedy return to health.

Leslie F. Curtis, assistant professor of electrical engineering at the University of Washington, is back again with his classes at Seattle after a recent visit to Los Angeles, where he delivered one of the most interesting papers pre-



A. E. Wishon, assistant general manager of the San Joaquin Light & Power Corporation, who as president of the Pacific Coast Section, N. E. L. A., won enthusiastic response from the Northwest Convention in his plea to assist President Ballard of the National Association in putting over next spring the greatest convention ever attempted in affairs electrical in the West.



H. J. Gille, salesman, Puget Sound Traction, Light & Power Company, who as president of the Association has passed up the traditions of the Association to even higher levels of accomplishment. The recent convention activities over which Mr. Gille presided have lent a certain enthusiasm and promise to affairs electrical in the West that means much to the future of the industry.



O. B. Coldwell, superintendent of the Portland Railway, Light and Power Company, who as chairman of the Executive Committee of the Association is already personally planning the great special train from the Northwest to the Los Angeles convention of the N. E. L. A. next spring. Mr. Coldwell expects to visit California during October.



John B. Fiske, chief engineer of the Washington Water Power Company, who is the newly elected president of the Northwest Electric Light & Power Association. Mr. Fiske, as vice-president of the American Institute of Electrical Engineers and chairman of the recent Pacific Coast Convention of the Institute has established for himself a reputation for accomplishment.

sented at the recent Pacific Coast Convention of the American Institute of Electrical Engineers.

John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, is visiting various Eastern centers and conferring with many able leaders of the electrical industry regarding matters of public policy to be discussed in his annual report to the N. E. L. A., as chairman of the Public Policy Committee.

O. B. Goldman, professor of engineering at the Oregon Agricultural College, is director of a course in heat engineering being offered in Portland at the request of the local Union of Steam and Operating Engineers. Professor Goldman is familiar to readers of the *Journal of Electricity* as the author of several instructive articles on heating.

G. E. Armstrong, electrical engineer with the Southern California Edison Company, and L. M. Klauber, superintendent of generation for the San Diego Consolidated Gas & Electric Company, are both recent San Francisco visitors, where they have been attending sessions of the engineering committee of the Pacific Coast Section, N. E. L. A.

Joseph E. Johnston, recently with the University of California, where he has during past months been engaged in advertising work for the *Daily Californian*, published by the Southern Branch of the University of California at Los Angeles, has joined the advertising staff of the *Journal of Electricity* and is preparing to make his permanent headquarters in New York City.

J. F. Orr, chief engineer of the Idaho Power Company with headquarters at Payette, Idaho, together with Mrs. Orr enjoyed a most pleasant trip up the Columbia Highway with O. B. Coldwell of the Portland Railway, Light & Power Company, before returning to his home in Idaho from attendance at the Northwest Electric Light and Power Association convention at Seattle.

S. M. Kennedy, general agent of the Southern California Edison Company, Ben Maddox, district manager of the Mt. Whitney Light & Power Company, and E. B. Criddle, commercial agent of the Southern Sierras Power Company, are again at their desks after an enjoyable trip north to Seattle, where they attended the recent convention of the Northwest Electric Light and Power Association.

W. S. Berry, Pacific Coast sales manager of the Western Electric Company, and D. E. Harris, sales manager of the Pacific States Electric Company, are both back again at their respective San Francisco offices after an interesting and profitable business trip through the Northwest during which they attended the sessions of the Northwest Electric Light and Power Association at Seattle.

R. H. Ballard, vice-president of the Southern California Edison Company and president of the National Electric Light

Association, after spending some weeks past in various sections of the nation in the interests of the national association, is now turning his face westward and expects to be again in California by the end of October. He is accompanied in his trip West by W. H. Onken, Jr., editor of the *Electrical World*.

Herbert Hoover, one of California's most distinguished engineers, is again at his home in Palo Alto. At a recent dinner at the Commercial Club given by the engineers of San Francisco, where perhaps the most distinguished group of engineers ever assembled in San Francisco was present, he was welcomed home as the one man most able and best prepared to serve human kind in the great days of readjustment now upon us.

G. B. McLean, former assistant superintendent of sales, Southern California Edison Company, Los Angeles, has recently returned from France where he has been engaged in Y. M. C. A. work for the past year. Mr. McLean only paid a short visit to his friends in Los Angeles, as he has accepted a position with the California Raisin Growers' Association at Fresno. His many friends in the electrical fraternity wish him every success in his new work.

John C. Pyle, of Los Angeles, who has for many years been connected with the Los Angeles Gas & Electric Company, has been appointed district sales agent, with headquarters in Los Angeles, for the Standard Underground Cable Company. Mr. Pyle takes the place of his brother, C. G. Pyle, who has been connected with the Standard Underground Cable Company for several years and who is resigning in order to enter the export business in San Francisco.

Carl Bush, for the past two years assistant secretary of the Seattle Chamber of Commerce and Commercial Club, has resigned his position and become associated with A. J. Rhodes of that city as general supervisor of the Rhodes Company, which conducts a department store. For five years Mr. Bush was in charge of the sales of the local branch of the Western Electric Company and resigned to become assistant general manager of the A. G. Electric & Manufacturing Company, remaining with the latter concern for two years.

Frank E. Bonner, engineer in charge of road construction for the Forest Service, is a recent San Francisco visitor. Mr. Bonner reports directly to O. C. Merrill, chief engineer of the Forest Service at Washington. While on his western tour of inspection he is visiting Captain Allan H. Toole and Captain Howard Toole, with Clifton & Applegate, contracting engineers of Spokane; also Captain James H. Bonner, his brother, who is now chief engineer of the Montana Railroad Commission, Helena, Montana. These four engineers received their engineering instruction under the direction of Robert Sibley, editor of the *Journal of Electricity*, in the days when Mr. Sibley was dean of the engineering school at the University of Montana.

Meeting Notices for Electrical Men

(San Francisco has been the scene of a number of important and interesting meetings during the past few weeks, chief among them the meetings of N. E. L. A. committees and the Electrical Development League. The Contractor-Dealers have also been active both in the bay district and in the Northwest. The date of the much-looked-forward-to N. E. L. A. Convention is now announced.—The Editor.)

San Francisco Electrical Development League

September 29th was "Pacific Service" Day at the San Francisco Electrical Development League. Many representatives of the Pacific Gas & Electric Company were present as guests, and a chorus made up of women employes of the company enlivened the session with song.

Henry Bostwick, San Francisco district manager, Pacific Gas & Electric Company, and outgoing president of the League, acted as chairman. He gave a review of the progress during his term, and urged that the organization become even more of an active force in public affairs. Mr. Bostwick, in passing, paid a graceful compliment to the work of the Journal of Electricity in furthering the development of the industry in the West.

A. Emory Wishon, assistant general manager, San Joaquin Light & Power Corporation, reported the happenings at the Northwest Electric Light and Power Association convention at Seattle, whence he had just returned.

Edward Whaley described the properties of the Northern California Power Company, recently merged with the Pacific Gas & Electric Company; and W. G. Vincent, valuation engineer of the company, told something of what the combination means. The system, he declared, now includes 19 hydroelectric plants and 3 steam plants, and serves a territory 16,000 square miles in extent. The company has over 500,000 consumers; has a yearly electric power output of one billion kw-hr. and a peak load of 200,000 kw-hr., which only four power companies in the United States can equal.

Lee H. Newbert, manager of the commercial department, Pacific Gas & Electric Company, spoke on the working organization of the California Electrical Cooperative Campaign. Senator C. P. Cutten, of the legal department of the company, said a few words as to the relation of the Law and Public Service.

R. E. Fisher, chairman of the Public Policy Committee of the League, urged that it now take on more important duties, and that it fully represent all interests of the electrical industry before the public. He also discussed the possibility of establishing a new Electrical Building in San Francisco, as a local center for the industry. Leon Van Atta, chairman of the membership committee, reported that there are now 204 members in the San Francisco Electrical Development League.

At the meeting of the League on October 6th, the women of the electrical industry and the wives of the mem-

bers were the honored guests. The speaker of the day was Mrs. Grace Palmer Craig, of the "Literary Digest," who gave an inspiring talk on Applied Psychology in Business.

President E. O. Shreve outlined briefly the plans for his term of office, and received the reports of various committees on their proposed activities for this period. Robert Sibley, editor of the Journal of Electricity, acted as chairman of the day and introduced the speaker.

The committees for the ensuing term were announced by President Shreve, as follows:

Finance Committee—C. E. Ingalls, chairman; J. V. Anthony, Grover Anderson.

Membership Committee—A. E. Rowe, chairman; W. L. Neelands, Marcel Hirsch, C. F. Butte, Thomas Bennett, H. C. Hopkins, R. M. Alvord.

Program Committee—F. E. Boyd, chairman; L. J. Brown, C. C. Davis, Aubrey Drury, F. E. Geibel, A. Kempston, W. G. Vincent.

Visiting and Relief Committee—M. A. De Lew.

Reception and Attendance—H. S. Jones, chairman; E. E. Browne, W. B. Francis, Earle P. Durley, N. H. Millar.

Publicity Committee—H. C. Hopkins, M. P. Dolman.

Public Policy Committee—R. E. Fisher, chairman; Garnett Young, Robert Sibley, R. W. DuVal, J. B. Black.

Electrical Contractors and Dealers' Association of San Francisco

Regular weekly meetings of the Electrical Contractors and Dealers' Association of San Francisco were held on September 26th and October 3rd. In each of the sessions profitable discussion was carried on regarding the problems of the trade. At the meeting of September 26th additions to the by-laws were adopted, providing for full cooperation with the contractor-dealers of Alameda county, as outlined in the last issue of the Journal of Electricity.

On October 3rd, five delegates were appointed to represent the organization on a central conference committee being formed under the auspices of the San Francisco Building Trades Council. Those selected were C. F. Butte, temporary chairman; Thomas J. Bennett, Joseph M. Carlson, T. De Pass and Peter Decker.

National Electric Light Association

Commercial Committee, Pacific Coast Section.—A special meeting of the Commercial Committee, Pacific Coast Section N. E. L. A., was called in San Francisco on September 22 by Chairman K. E. Van Kuran, who outlined the general plan of committee organization for the coming year, and announced the personnel of the committee to be as follows:

K. E. Van Kuran, Westinghouse Elec. & Mfg. Co., Los Angeles
R. G. Arthur, Douglas Light & Trac. Co., Douglas, Ariz.
R. A. Balzari, Westinghouse Elec. & Mfg. Co., San Francisco
T. R. Burger, Baker-Joslyn Co., Los Angeles
P. H. Booth, Edison Elec. Appliance Co., Ontario, California
M. R. Buchanan, Silver City Power Co., Silver City, N. M.
J. O. Case, General Electric Co., Los Angeles

BUILDERS OF THE WEST — LXIII



A. W. LEONARD

The great Northwest in industry and development today stands forth as an instance probably not equaled in the annals of the world in rapid accomplishment—particularly in so far as shipping and intercourse with foreign neighbors is concerned. No one who has visited this thriving district of our nation today and seen how the very heart-throbs of industry are there made possible by hydroelectric development can deny the part electricity has played in this wonderful work. To A. W. Leonard, president of the Puget Sound Traction, Light & Power Company, this issue of the Journal of Electricity is affectionately dedicated as a lasting memorial to his constructive optimism that has at all times, through the darkest periods, maintained such a clear vision of the possibility of electrical accomplishment that he has thus been enabled to sweep all obstacles before him and add another distinct triumph of the method electrical in the magnificent upbuilding of the West.

A. W. Childs, Southern California Edison Co., Los Angeles
 S. W. Coleman, Coast Counties Gas & Elec. Co., San Francisco
 H. H. Courtright, Valley Electric Co., Fresno, Cal.
 E. B. Criddle, Southern Sierras Power Co., Riverside, Cal.
 F. D. Fagan, Edison Lamp Works, San Francisco
 R. E. Fisher, Pacific Gas & Electric Co., San Francisco
 C. B. Hall, Illinois Electric Co., Los Angeles
 A. H. Halloran, Journal of Electricity, San Francisco
 L. M. Hardie, Great Western Power Co., San Francisco
 D. E. Harris, Pacific States Electric Co., San Francisco
 H. L. Harper, Western Electric Co., Los Angeles
 A. E. Holloway, San Diego Cons. Gas & Elec. Co., San Diego, Cal.
 Carl Heilbron, Southern Electric Co., San Diego, Cal.
 Carl Johnson, U. S. Electrical Mfg. Co., Los Angeles
 H. B. Johnson, Bisbee Improvement Co., Bisbee, Arizona
 Hugh Kimball, Kimball Electric Co., Oakland, Cal.
 H. J. Kister, Los Angeles Gas & Elec. Co., Los Angeles
 F. D. Mechling, Nevada-California Power Co., Tonopah, Nevada
 H. L. Miller, Pasadena, California
 Arthur Prager, Albuquerque Gas & Electric Co., Albuquerque, N. M.
 J. C. Rendler, Southern California Electric Co., Los Angeles
 Geo. N. Rooker, Western States Gas & Electric Co., Richmond, Cal.
 M. L. Scobey, Home Electrical, San Francisco
 T. W. Simpson, Federal Electric Co., San Francisco
 S. E. Taylor, Elec. Ry. & Mfrs. Supply Co., San Francisco
 W. S. Townsend, Las Vegas Light & Power Co., Las Vegas, N. M.
 E. B. Walthall, San Joaquin Light & Power Corp., Fresno, Cal.
 M. V. Watson, Prescott Gas & Electric Co., Prescott, Arizona
 P. M. Wentworth, Truckee River General Electric Co., Reno, Nevada
 Garnett Young, San Francisco, California

Chairman Van Kuran stated that the first duty of the committee is to arrange for the writing of papers which will be published during the year. Written discussion is to be invited at the time of publication and final oral discussion will be held at the annual convention.

President A. E. Wishon advised that the executive committee had agreed upon a plan for joint sessions at the convention so that all angles of a paper could be developed. The function of the commercial committee will be to bring out the commercial features of a paper, and of the engineering committee to bring out the engineering features.

Chairman Van Kuran suggested that one member of the commercial committee be selected as a sub-chairman of a committee to report upon each of the general subjects already agreed upon by the executive committee. The chairman of each sub-committee will take unto himself suitable assistants, investigate the commercial aspect of the subject and if determined advisable prepare a paper. The following chairmen of respective sub-committees were appointed:

E. B. Criddle:	Commercial Aspects of Railway Electrification.
E. B. Walthall:	Commercial Aspects of Water Storage at Higher Elevations.
B. W. Coleman:	Commercial Aspects of Standardized Accounting Systems for Municipalities.
H. H. Courtright:	Commercial Aspects of Standardization of Wiring Devices and Methods.
	Commercial Aspects of Standardizations of Terminals for Household Appliances.
Garnett Young:	Commercial Aspects of Education of Architects and Builders.
R. E. Fisher:	Commercial Aspects of Interchange of Power.
A. E. Holloway:	Commercial Aspects of Steam Plants vs. Stored Water Standby.
R. A. Balzari:	Commercial Aspects of Encouraging Development of Oil Lands.
P. H. Booth	Commercial Aspects of Participation in Foreign Trade Movements and Standardizing Units of Measurement.

Chairman Van Kuran next suggested a number of additional subjects for investigation and report, the following sub-committee assignments being made:

A. W. Childs:	The Value of Solicitors to Central Stations, Contractor-Dealers, Jobbers and Manufacturers.
Carl Johnson:	Internal Combustion Engines vs. Central Station Power.
F. D. Fagan:	Value of Better Illumination.
J. O. Case:	Statistics Regarding Unelectrified Horsepower.
A. H. Halloran:	Publicity.
A. E. Holloway:	Industrial Heating.

After an intermission for lunch with the San Francisco Electrical Development League a joint session was held with the Publicity Committee. As chairman thereof I. W. Alexander briefly outlined the results of his committee's morning conference and called upon C. H. Pierson to explain the plan for a series of electrical pages to be published in papers throughout the Section area. Mr. Pierson advised that there are about 410 papers in which California central stations are already advertising, and might be induced to concentrate their display cooperatively with additional advertising by the contractor-dealers.

Advertising and Publicity Service Bureau.—The Advertising and Publicity Service Bureau of the Commercial Section, N. E. L. A., will meet at the Hotel Sherman in Chicago on October 22, to lay out the work of the divisions and get the work of the Bureau under way.

Meeting of the Inductive Interference Committee.—The first meeting of the newly formed Inductive Interference Committee was held in Chicago on September 22 and 23. It is the purpose of the committee to study the inductive interference situation and its relation to practices of the power industry.

Plans were developed for organizing and inaugurating the committee's work in pursuance of which two sub-committees were appointed, one for the purpose of collecting general data pertinent to the subject and the other for studying the problems being encountered.

The efforts of the former sub-committee, of which Mr. S. G. Rhodes is chairman, will include the gathering and analyzing of all available data of actual cases of inductive interference, with descriptions in detail of the causes, nature and extent of disturbance, measures of relief applied, allocation of expense involved and other conditions. Any company that has experienced troubles of this character can lend effective support to the committee by contributing their information, mailed to W. C. Anderson, Technical Secretary, National Electric Light Association, 29 West 39th Street, New York City.

The latter sub-committee, of which Mr. H. B. Gear is chairman, will work toward building up a centralized agency for assisting power and lighting companies to arrive at sound and proper solutions of their inductive interference problems, and for effecting a closer cooperation in matters of this nature.

The chairman of the Inductive Interference Committee is A. E. Silver, Electric Bond and Share Company, 71 Broadway, New York City.

Electrical Supply Jobbers' Association

The last 1919 meeting of the Pacific Division of the Electrical Supply Jobbers' Association is scheduled to take place at Del Monte, November 13, 14 and 15. It is hoped that an extra large attendance will mark the event. The National Convention of the Association is planned for the early spring of 1920, and several interesting papers are promised.

Joint Meeting of A. I. E. E. and I. R. E.

A joint meeting of the American Institute of Electrical Engineers and the Institute of Radio Engineers was held in the Auditorium of the Engineering Societies Building, 35 West 39th Street, New York, on October 1, 1919, at 8:15 p.m. Three papers were presented, as follows:

Trans-Oceanic Radio Telegraphy, by E. F. W. Alexanderson, of the General Electric Company.

Telephone Repeaters, by F. B. Jewett and B. Gherardi, both of the Western Electric Company.

Principles of Radio Transmission and Reception with Antenna and Coil Aerials, by J. H. Dellinger of the Bureau of Standards.

Colorado Electric Light, Power and Railway Association

A meeting of the Colorado Electric Light, Power and Railway Association was held at Glenwood Springs, Colorado, recently. Among the papers read was one on Electric Cooking by P. L. Miles of the range department of the Edison Electric Appliance Company, Chicago.

American Society of Mechanical Engineers

The following have been appointed to compose the Committee on Code of Ethics of the American Society of Mechanical Engineers:

A. G. Christie, Assoc. Prof. Mech. Eng., Johns Hopkins University.
 Robert Sibley, Editor, Journal of Electricity.
 John V. Martenis, Asst. Prof. Mech. Eng., University of Minnesota.
 H. John O. Hinchey, Sales Engr., Buffalo Steam Pump Co., Atlanta, Ga.
 Charles T. Main, Boston, Mass., as the committee's consultant.

American Society of Civil Engineers

At a recent meeting of the San Francisco branch of the American Society of Civil Engineers, unanimous action was taken in approval of the proposed National Department of Public Works. The following extract is from the statement of C. E. Grunsky, consulting civil engineer of San Francisco, and C. D. Marx, head of the engineering department of Stanford University, with reference to a National Department of Public Works, as discussed at the Chicago Convention of the American Society of Civil Engineers:

The United States has not yet adopted any clearcut policy relating to the construction and maintenance of public works. The practice here prevails of creating bureaus with special duties to function as long as may be necessary whenever any new investigation is to be made or some new construction work is to be undertaken. The result of this system is that the bureaus have become a powerful factor in administration affairs. Each bureau presenting evidence more or less convincing can and often does put forth the claim that by specializing on one line of work with freedom of action, it can operate more effectively and handle its problems more comprehensively than if its affairs were adjusted to the requirements of other bureaus and agencies. The freer more effective action is claimed because the bureau can act with least interference from above, without that supervision and control which, under the department plan, would prescribe and direct its activities, always limited by and adjusted to the functions and scope of work of other agencies. The claim is made and perhaps with some reason that there will be less initiative by the individual bureau under the department plan than if the bureaus are, as at present, allowed to function independently. This, however, is but a trifling advantage and is far outweighed by the many advantages that are easily recognized in the department plan.

The Chicago conference in April, at which were represented technical societies with a total membership of 105,000, unanimously approved the plan and has sent out the following statement regarding it:

"1. The United States is, with one exception, the only nation of importance not now administering its public works through such a department.

"2. The public works activities are now spread out over many departments, with no coordination of effort. Duplication necessarily results as well as conflict of authority and great waste of public funds.

"3. Public works are strictly technical in their character and require the services of a permanent and skilled personnel for their efficient construction and operation.

"4. The creation of such a department would result in the formation of a technical organization competent to administer the engineering work of peace and further to provide the nucleus of an organization capable of being expanded immediately to meet the war construction and research needs of the country.

"5. The formation of such a department would attract to its service competent men of a calibre not now available for Government work; would create a permanent body of skilled, experienced men competent to undertake new enterprises, whose permanence of employment and pride of accomplishment would create an excellent 'esprit de corps.'

"6. There is no organization of this kind in existence capable of rendering this service.

"7. It would permit of a unified control over public works and a comprehensive plan for their continuance over a term of years according to a modern and businesslike financial plan based on an annual budget.

"8. It would give great stimulus to technical research and study and create machinery whereby we could compete more nearly on a parity in mechanical matters with the research departments of other great powers."

The program is to create a new department without disturbing the present activities of any bureau and it would be left to those who are entrusted with the administration of the Department's affairs to bring about a gradual and efficient coordination of the various bureaus and services. This would all be easy if it were not for the fact that the function of the Engineer Corps of the U. S. Army in relation to river and harbor work has become traditional. There is, however, no need for perpetuating this relation. The civilian engineer has a right to demand that he be placed on the same plane as the army engineer. The non-military character of national public works should be recognized and whenever it is found desirable to assign a military character, let this be without privileges other than are accorded to the civil engineer. The military engineer educated at West Point at the expense of the country, mainly along military lines, has no better qualifications to serve in a department of public works and no better claim to service than the civil engineer who gets his professional training at his own expense. The distinction in favor of the military engineer which has prevailed in the past on river and harbor work must fall away.

Every engineer, architect and technologist is directly interested both by reason of professional activities and citizenship in the present movement and should lend his aid to the accomplishment of the purpose as outlined.

A bill to create a Department of Public Works on the lines indicated has been prepared by the Committee, appointed for the purpose at the Chicago conference, and has been introduced in the Senate by Senator Wesley L. Jones and in the House by Frank C. Reavis.

American Institute of Electrical Engineers

The following are among the western men elected to associate membership in the American Institute of Electrical Engineers at the meeting of August 12, 1919:

James E. Barrett, Statistical Department, San Joaquin Light & Power Corporation, Fresno, Cal.; Frederick Ernest Cook, Motive Power Office, United Railroads of San Francisco, San Francisco, Cal.; Edward H. Cookingham, manager Telephone & Electric Supply Co., Spokane, Wash.; Herbert A. Cordes, Student, University of Southern California, Los Angeles, Cal.; Frank A. Gift, Division Electrician, Plant Dept., Western Union Telegraph Co., San Francisco, Cal.; Carl Hagen, Chief Electrician, Portland Lumber Co., Portland, Ore.; Ralph A. Hopkins, Sales Engineer, Westinghouse Electric & Manufacturing Co., Los Angeles, Cal.; Oliver F. Johnson, Engineer, The Pacific Tel. & Tel. Co., San Francisco, Cal.; Donald K. Lippincott, Chief Engineer, Motor Protector Mfg. Co., San Francisco, Cal.; Myron Manwaring, Electrician, Salt Lake County, Murray, Utah; Angus McKechnie, Asst. Power Apparatus Specialist, Western Electric Co., Seattle, Wash.; T. Miwa, Supt. California Vegetable Packing Co., Los Angeles, Cal.; Albert E. Nevatt, Inspector, B. & P. Coke Plant, Colorado Fuel & Iron Co., Pueblo, Colo.; Francis M. Ryan, Student in Electrical Engineering, Univ. of Washington, Seattle, Wash.; Ernest K. Sadler, Dist. Supt. Nevada Valleys Power Co., Battle Mountain, Nevada; Vincent E. Small, Electrician, Skinner Eddy Corp., Seattle, Wash.; John J. Tokarske, Electrician, Colorado Fuel & Iron Co., Minnequa Works, Pueblo, Colo.; James Maxwell Wells, Electrical Inspector, City of Riverside, Riverside, Cal.

N. E. L. A. Convention

The coming annual convention of the National Electric Light Association, to take place in Southern California, will be held May 18th to 21st, 1920. Detailed plans for this most important gathering will be announced at a later date, and promise to be more than usually full of interest.

The semi-annual Sales Conference of the Montana Electric Company, held at Hayden Lake, Idaho, September 15th to 19th, was marked by a large and enthusiastic attendance. In addition to the program there were a number of interesting golf and fishing contests.



HAPPENINGS IN THE INDUSTRY

LEASE OF BUSINESS

In view of the long and efficient service to the electrical industry that has been rendered by D. Hayes Murphy, president Harry B. Kirkland, vice-president, and Guy M. Stewart, secretary of The American Conduit Manufacturing Company of New Kensington, Pa., the following announcement by this well-known company is of unusually timely interest to the industry:

We wish to announce that our Rigid Conduit business has been leased to the General Electric Company and will continue to be operated at New Kensington by its Sprague Electric Works.

Plans are being prepared for the enlargement of the plant and additional equipment will be installed, to the end that the users of American and Galvanite brands of Rigid Conduit will have the advantage of exceptional service under all conditions.

There will be no change in the personnel of this company, but the name will be changed to the American-Wiremold Company, which will concentrate upon the manufacture of Wiremold surface raceway and Wireduct one-metallic tubing, at Hartford, Connecticut.

Mr. H. B. Kirkland will divide his time between the Sprague Electric Works and the American-Wiremold Company, and will continue to give personal attention to his old customers.

Mr. Kirkland, Mr. Stewart and the writer are highly appreciative of your many favors in the past, and bespeak a continuance of your patronage on rigid conduit for the Sprague Electric Works.

IMPORTANT CHANGE IN COMPANY MANAGEMENT

There was organized recently in Chicago a new corporation under the laws of the state of Illinois to be known as The Booth Electric Furnace Company, with paid-up capital of \$1,000,000. Of this amount one-half is preferred stock, and one-half common. The new company has acquired all the patents, assets, and good-will of the Booth-Hall Company, well known as manufacturers of electric steel and brass melting furnaces, and has taken over the business formerly carried on by that company. It will greatly enlarge the scope of operations, and develop the electric furnace business along standard manufacturing lines rather than on a special engineering basis.

The new company will have exceptional manufacturing facilities for turning out furnaces in quantities. Not only have all parts been standardized, but each furnace will be assembled complete before shipment, and thoroughly tested out to absolutely insure mechanical and operating perfection.

L. E. Myers, of Chicago, president of the L. E. Myers Company, has been elected president of the new corporation; C. H. Booth, formerly president of the Booth-Hall Company, vice-president; W. K. Booth, formerly chief engineer of Booth-Hall Company, secretary; and L. J. Clark, of the Myers Company, treasurer. In addition to the president, vice-president and secretary, the board of directors will include Martin J. Insull, vice-president of the Middle West Utilities Company, and E. W. Lloyd, of the Commonwealth Edison Company, both of Chicago.

The new company is prepared to carry on an aggressive campaign for business, and will open sales offices in different parts of the country. An adequate engineering staff will be maintained to cooperate with customers in connection with their electro-metallurgical problems, especially those relating to the melting of metals.

ELECTRICITY AND LOGGING

Gasoline as a motive power is in common use by the loggers of the Pacific Coast, and operators now are going further and investigating the application of electricity. Just what has been accomplished in this direction was one of the subjects discussed before the recent annual convention of the Pacific logging congress.

The logging congress embraces in its jurisdiction Oregon, Washington, Idaho, California, Montana and British Co-

lumbia. It is the technical conference of the logging operators in this territory and has done much to standardize methods of logging engineering.

The tenth session considered the results attained in the operation of the Snoqualmie Falls Lumber Company, Snoqualmie Falls, Wash., where an electrically driven donkey engine is in use. Recognized authorities on this subject surveyed the general application of electricity to logging operations. Among other technical subjects discussed was the mechanical felling of timber.

The work of the American forest regiment in France was displayed by a moving picture film. How California safeguards mill and camp employees was shown in a film illustrating methods of accident prevention. Another film told the story of the invasion of the mills by the motor truck, describing how heavy Pacific coast timbers are handled by this method of transportation.

YOSEMITE BUILDING PLANS

A two-story frame tourist hotel, 200 bungalows, lodge building, hydroelectric plant, ice plant, garage, group of store buildings and a warehouse will be constructed in Yosemite National Park by the Yosemite National Park Company. Messrs. Miller & Warnecke, Perry Building, Oakland, and Call-Post Building, San Francisco, are preparing the plans. Gutleben Bros., Post-Call Building, San Francisco, will be the contractors in charge of the work. Construction work will be started the first of the year, but most of the materials will be purchased and sent into the park before that time.

INCREASES IN BUILDING TRADE

Contrary to expectations that labor unrest, strike troubles, high-price agitation and all the other troubles that beset the building trade in August would cause a setback to activity in the direction of new construction, the total expenditure permitted for at 147 cities for that month was \$150,583,823, which dwarfs the record July expenditure of \$136,743,439 and marks a gain of 249 per cent over August a year ago. In view of the close connection of house wiring activities with the building operations, these figures are especially significant for the electrical industry.

FREIGHT CAR EFFICIENCY

Walker D. Hines, Director General of Railroads, earnestly urges all shippers and receivers of freight to redouble their efforts to promote freight car efficiency, and has issued a statement of the subject.

Shippers of freight can assist—

1. By loading all cars to full visible or carrying capacity.
2. By prompt loading and release to the carrier.
3. By ordering cars only when actually required.
4. By eliminating the use of railway equipment in trap or transfer service when tonnage can be handled by motor truck or wagon.
5. By reducing the diversion and reconsignment of cars to a minimum.

Receivers of freight can assist—

1. By prompt unloading of cars and notice hereof to the carrier.
2. By ordering goods in quantities representing the full safe carrying capacity of cars and disregarding trade units.
3. By ordering from the nearest available source.
4. By pooling orders so as to secure full car load.

A resumption of intensive loading will not merely reduce the number of cars under load but will also relieve congested terminals where it is a question of track room rather than of equipment.

With a strong concerted effort on the part of the Railroad Administration and the shippers and receivers of

freight, it is hoped that during this period of abnormally heavy traffic, the nation's transportation needs may be met with reasonable satisfaction to all parties.

TRUTHFUL ADVERTISING

A movement is on foot among Baltimore business men whereby they hope, through discovering and classifying the pitfalls that lead to advertising misstatements, to prevent advertising untruths and advertising half truths which are so destructive of business good will. A recently issued document by the Vigilance Committee of the Advertising Club sets forth the following principles:

Truthful advertising must be prepared with careful reference to the following points:

1. The Origin of the Merchandise—

"Special Purchase" must not be used unless the merchandise has been bought at less than the usual prices. "Overstock," "Clearance," "Remnants," and similar expressions must be used only when they represent the exact facts in the case.

2. The Description of the Merchandise—

Size and colors should always be given with absolute accuracy. If the merchandise is slightly defective, the expression "seconds" or "slightly imperfect" should be given a prominent place in the description.

3. The Value of the Merchandise—

Comparative values have no place in truthful advertising. By comparative values is meant the statement that an article is "worth" a price in excess of the selling price.

4. Illustrations—

These should always faithfully represent the object advertised, and should not convey any false or misleading impression of its size or appearance. The custom of using illustrations which do not directly refer to the article advertised should be discontinued, unless such illustrations are clearly used only as a decoration to the advertisement or as an identification of the class of merchandise advertised.

Store Signs—

Store signs and windows and other merchandise displayed must conform to the same standard of truthfulness as the advertising.

Sales People—

Advertisers must use every possible effort to see that representations made by sales people are in conformity with the advertising.

HETCH HETCHY IN MOVING PICTURES

For the purpose of showing the people of San Francisco just what is being done on the Hetch Hetchy project, and stimulating the sale of the bonds, the public utilities committee of the Supervisors has recommended an appropriation of \$1500 to film the power project. The sale of bonds is at present almost at a standstill, but with available funds handy at all times, the city engineer estimates that the power project will be completed in 1922 and water brought to San Francisco by 1924.

IMPERIAL VALLEY SETTLEMENT

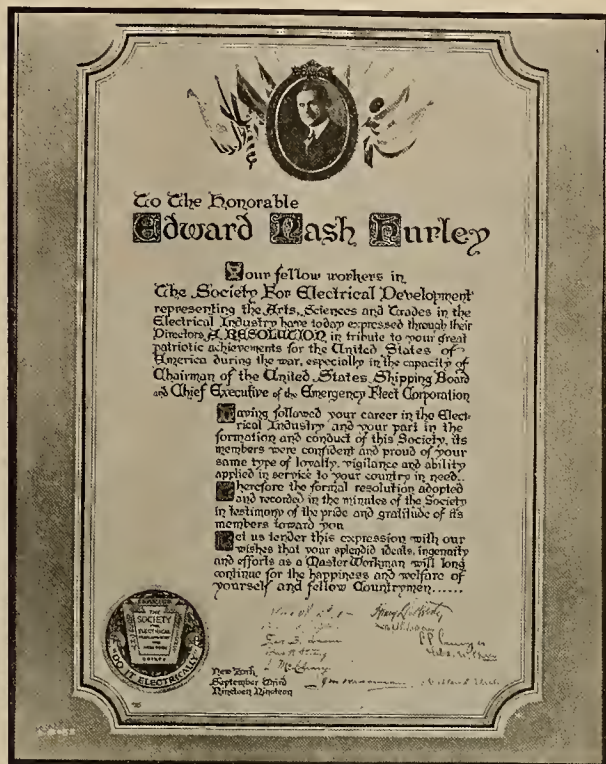
Delegates from the most important organizations and departments of the government and public institutions interested in the irrigation and settlement of 200,000 acres of public land in the Imperial Valley met recently at a conference at the University of California, Berkeley, under the chairmanship of Dean Thomas Forsyth Hunt of the College of Agriculture of the State University.

Agencies represented included the United States Department of Agriculture, United States Reclamation Service, Imperial Valley Irrigation District, American Legion of El Centro, of Los Angeles and of Oakland, California Development Board, Sacramento Valley Development Board, College of Agriculture of the University of California, State Board of Control, State Engineering Department, Board of Supervisors of Imperial County, Attorney General, Surveyor General, and State Water Commission.

Among the various plans discussed was included that of the Land Settlement Board of California, which proposes that a part of the land be set aside for soldier settlement under the California Land Settlement Act. A proposal was submitted, also, for the exchange of school lands in the forest reserves for irrigable lands on the mesa. It is stated that by selling these lands to the State Land Settlement Board, the income to the state's school fund would be materially increased and soldiers would be enabled to secure cheap land for farms.

ELECTRICAL LUNCHEON TO EDWARD N. HURLEY

At a recent luncheon given at the Engineers' Club, in his honor by prominent men of the electrical fraternity, representing the Society for Electrical Development, Mr. Edward



The testimonial presented to Edward N. Hurley by the Society for Electrical Development at the recent luncheon held in his honor

N. Hurley was presented an engrossed parchment testimonial expressing appreciation of his work while head of the United States Shipping Board.

The presentation was made by Mr. J. M. Wakeman, general manager of the Society. In acknowledging the presentation, Mr. Hurley said:

"I wish to voice my appreciation of your interest and your testimonial. There is no organization I would rather see this testimonial come from than the Society for Electrical Development. From the time it started I have recognized that it had a most important task to perform—the education of the public, as well as the electrical men themselves.

"I resigned my job with the Shipping Board to get back to the electrical business, and I have spent some six weeks investigating what has been going on since I left it to take up governmental work. I am astounded at what has been done."

The testimonial to Mr. Hurley is signed by the following directors of the Society for Electrical Development:

Henry L. Doherty, president, Cities Service Company
James H. McGraw, president, McGraw-Hill Company
Joseph E. Montague, vice-president, Niagara Electric Service Corp.
E. W. Rockafellow, Western Electric Company
Fred B. Adam, president, Frank Adam Electric Company
James R. Strong, president, Tucker Electric Construction Company
L. P. Sawyer, National Lamp Works of General Electric Company
Fred Bissell, president, F. Bissell Company
Walter D. Steele, vice-president, Benjamin Electric Mfg. Company
Ernest McCleary, president, McCleary-Harmon Company
Charles W. Price, chairman of board, Electrical Review
J. Smiley, Jr., secretary-treasurer, The Society for Electrical Development
J. M. Wakeman, general manager, The Society for Electrical Development

INTERNATIONAL TRADE CONFERENCE POSTPONED

Late cable advices about delays incident to the departure of delegates from Italy, France and Belgium have made it necessary to postpone the International Trade Conference, called at Atlantic City by the Chamber of Commerce of the United States, from the week of September 29 to the week of October 20.

According to President H. L. Ferguson the program will be as outlined in the official announcement, but will be stronger because of the additional time which those participating will be able to devote to its preparation.

DEPARTMENT OF AERONAUTICS

The Los Angeles Chamber of Commerce has established a Department of Meteorology and Aeronautics. This is the first department of its kind to be established in the United States by a commercial organization. It is designed not only to foster development in commercial transportation, but also to establish meteorological service for the benefit of fruit-growers and farmers in general.

STREET RAILWAY FARES IN PORTLAND

An 8-cent street railway fare for Portland is asked in a petition filed recently by the Portland Railway, Light & Power Company, when President Franklin T. Griffith and other officials of the corporation appeared before the commissioners to present their arguments for an increase in passenger rates.

The city of Portland will contest any increase in street railway fares, declared Stanley Myers, deputy city attorney, who appeared at the hearing. Appearing with Mr. Myers for the city was J. P. Newell, author of the recently-suggested tripartite plan, whereby the city, the company and the employees were to be made beneficiaries in the operation of the lines.

Testimony of the company was to the effect that the 6-cent fare has barely sufficed to meet increased wage schedules and operating expenses when passenger traffic was at its height. Now, it was declared, the waning of the intensified industrial period is causing a sharp decline in receipts, presenting a critical situation to the company.

OPERATION OF RADIO ON U. S. MERCHANT FLEET

The United States Shipping Board has signed a contract with the Marconi Wireless Company which provides that the wireless corporation is to take over the operation and maintenance of all radio apparatus on 400 of the government vessels, according to Arthur A. Isbell, Pacific Coast manager of the Marconi Company.

San Francisco is the division headquarters for the Pacific Coast branch of the company and the radio maintenance will be directed from here. Five hundred radio operators and an increased number of repair and installation men will come under the control of the company. It is expected that later the contract will be extended to cover all of the 1200 ships of the government's mercantile fleet.

The company plans to have a full corps of efficient operators on hand to supply the ships and for this purpose the school for students will turn out numerous graduates right along. The ship owners prefer to lease the ship sets in most instances, because this has been found the most satisfactory way. Frequent changes and improvements made in the wireless make the old sets obsolete in a few years and those leasing thus have the advantage of receiving the benefit of new improvements without extra cost.

WESTINGHOUSE WAR MEMORIAL SCHOLARSHIPS AWARDED

The awards of the four annual War Memorial Scholarships of five hundred dollars each, established by the Westinghouse Electric & Manufacturing Company, have just been announced. These awards were made by competitive examinations.

Each scholarship carries with it an annual payment of five hundred dollars for a period not to exceed four years, the payment to be applied toward an engineering education in any technical school or college selected by the successful candidate with the approval of the scholarship committee.

These scholarships have been established as a memorial to those employees of the company and its subsidiaries who entered the service of their country during the war. Four

awards will be made each year, so that after three years this company will be maintaining sixteen of these scholarships in the best technical schools of the United States.

ELECTRIC POWER IN JAPANESE STEEL WORKS

The Mitsubishi Steel Works now under construction in Kiushu Province, the largest in that Province and one of the largest in Japan, is progressing steadily and the equipment will be complete in a few months. The assumed production capacity of the works is 13,000 tons of steel for the first year. All the machines used in the works are electrically driven.

MOTOR TRANSPORT TRAINING SCHOOLS OF THE ARMY

The United States Army is definitely launched in the field of vocational training for the motor transport corps. It has no option in the matter, for men skilled in automotive vehicle operation and repair do not exist in anything like adequate numbers for the requirements even of civil life. Therefore, the Army is organizing schools to train men in the various branches of automobile repair, construction and operation.

The United States Civil Service Commission is receiving applications to fill 150 positions of assistant instructor in motor transport training schools. The entrance salaries range from \$1,800 to \$2,400 a year. Detailed information may be obtained from the U. S. Civil Service Commission, Washington, D. C., or from the secretary of the U. S. Civil Service Board at the post office or custom house in any city.

TRADE NOTES

Agent Appointed —

The Roller-Smith Company, 233 Broadway, New York, N. Y., announces the appointment of the Alfred Collyer Company, 420 Power Building, 83 Craig Street West, Montreal, Canada, as its agent for the entire Dominion of Canada and Newfoundland.

The Alfred Collyer Company will handle the Roller-Smith Company's products of instruments and circuit breakers.

The same company has appointed the General Machinery Company, 744-5 Brown-Marx Building, Birmingham, Alabama, as its agent in the states of Florida, Georgia, Alabama and Tennessee. The General Machinery Company will handle the Roller-Smith Company's line of instruments, circuit breakers and meters in this territory.

Dissolution of Firm —

By mutual consent the firm of Butte Engineering and Electric Company, San Francisco, has been dissolved, and all assets are equally distributed between the partners. Paul C. Butté, founder of the concern, is to continue business under the firm name of Butte Electric and Manufacturing Company, at 534 Folsom Street.

All construction equipment and contracts in process of the Butte Engineering and Electric Company have been taken over by C. F. Butte, who will carry on this branch of the business at 530 Folsom Street, under the firm name of Butte Electrical Equipment Company.

Removal and Incorporation —

The Sierra Electric Company, formerly located in the Call-Post Building, San Francisco, has moved to larger quarters at 515 Market Street, where there is ample space for stock and display rooms. The company has incorporated with H. H. Van Luren, president, and F. I. DuFranc, sales manager.

New Store in San Francisco —

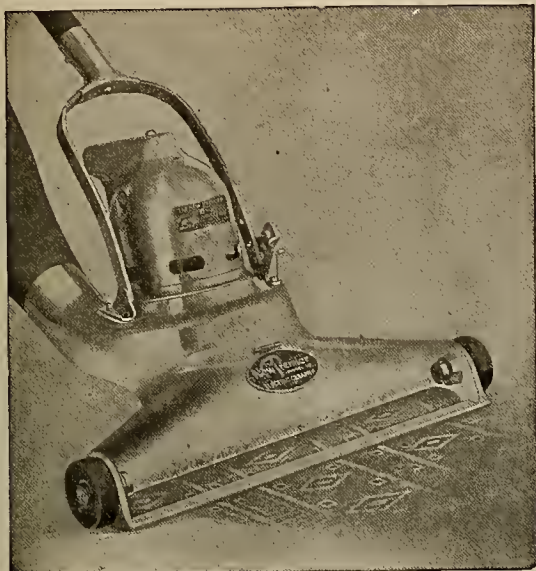
The Hurley Machine Company recently opened branch offices and salesrooms in San Francisco, under the name of The Thor Electric Shop, at 124 Post Street. The Hurley Machine Company manufactures the Thor electric washing machine and many other electrical appliances.

LATEST IN EVERYTHING ELECTRICAL

(A new vacuum cleaner with special interchangeable brushes is one of the features of this industrial review. Another item of interest is an installation of electrically operated dock cranes now under way at the army supply base at Boston. A circuit breaker with special features is a recent item put forward by the Pacific Electric Manufacturing Company of San Francisco.—The Editor.)

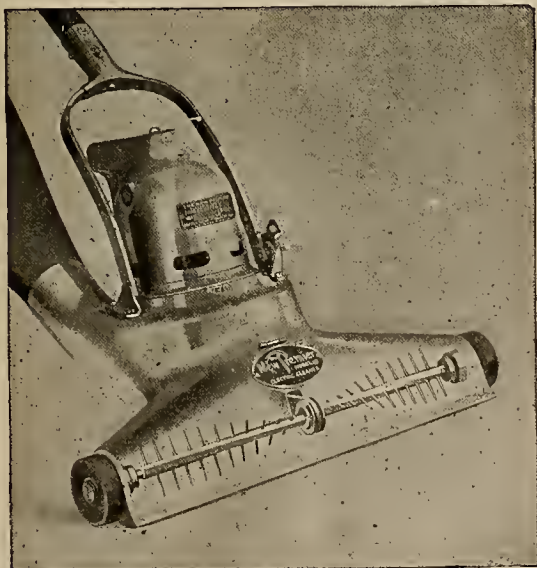
NEW MODEL VACUUM CLEANER

The new Premier just announced by the Electric Vacuum Cleaner Company of Cleveland, Ohio, is called the complete cleaner. It combines three methods. A tufted bristle brush



This view shows the cleaner with the tufted bristle brush inserted. This can be removed and the cleaner operated using the suction alone if desired.

and a pliable rubber fingered brush, both motor driven, are furnished. They are interchangeable. Either can be instantly removed and the cleaning done by the machine's extra powerful suction alone. The bristle brush is said to be the most



The special pliable rubber fingered brush which picks up the dirt much as the human fingers would do

effective yet put on the market. The rubber fingered brush is a feature which no other cleaner has. The rubber fingers pick up the dirt much as a human being would do. The extra

wide nozzle cleans a wider space. Its rubber tired wheels make it easy running, saving unsightly marks on floors.

An air-cooled General Electric motor, universal type, is used. The power control is an integral part of the pistol grip handle—a handle so arranged that it will stand rigidly upright at will. The ingenious nozzle mechanism makes adjustments unnecessary. Because of this improvement the Premier is automatically adjusted to get all the dirt regardless of the depth of the nap.

ELECTRICALLY OPERATED DOCK CRANES

The Wellman-Seaver-Morgan Company is now installing four semi-portal bridge type hoist cranes at the U. S. Army Supply Base, Boston. The first of these cranes is in operation and is shown in the accompanying illustration.

This crane carries a lifting boom operated from a carriage, which in turn is mounted on a semi-portal bridge and arranged to rotate about a fixed axis. The bridge runs on two rails, one located near the face of the wharf and the other supported on brackets carried on the side of the wharf shed.

It will be seen that the crane has four distinct motions—bridge travel along the wharf, trolley slewing, boom hoisting or luffing, and load hoisting. All of these motions are under the control of the operator located in the cab on the rotating carriage.

The crane is designed so that another drum can be added and a two-rope grab bucket operated. The crane is rated to handle 8000 pounds at a distance of 29 feet from the face of the capsill at the rate of 200 feet per minute and 5000 pounds at a distance of 52 feet at 250 feet per minute. It will, however, take care of occasional loads of 8000 pounds at 52 feet from the center of rotation without any undue stress in any part of the crane.

The principal dimensions of the crane are as follows:

Horizontal span, center to center of runway rails, 26 ft. 5 in.
Maximum reach of boom from face to capsill, 44 ft. 0 in.
Minimum radius of boom, 29 ft. 0 in.
Angle through which boom may be slewed equals 360 degrees.
Concrete counter-weight required, about 3 cu. yds.

The various motions of the crane have approximately the following speeds under full load:

Hoist, 5000 pounds, 250 feet per minute.
Hoist, 8,000 pounds, 200 feet per minute.
Boom hoisting or luffing, 125 feet per minute.
Slewing, 2 rotations per minute with 5000 pounds load at a maximum radius.
Bridge travel along the wharf, 200 ft. per minute.

The different mechanism is so arranged that the motion of either hoisting or luffing can be operated simultaneously with both rotating and traveling motions.

To the deck of the semi-portal bridge supporting the operating mechanism is bolted a steel casting for supporting the revolving superstructure. This casting has a track plate, and bolted to the outside, a circular rack for the slewing motion. Concentric with this casting is a hollow center pivot pin, the lower end of which is securely held by cross framing between the main girders of the semi-portal.

Each leg of the wharf side is carried on two wheels which are driven through the necessary spur and bevel gearing by the traveling motor. The flanges of the wheels running on the shed rails are placed to give about a seven-inch tread. Wheels running on the wharf rail have the flanges

spaced to allow proper clearance for the head of the rail upon which they run.

The base frame is made up of rolled steel shapes and plates well braced in all directions. The revolving super-



View of the semi-portal wharf crane in operation, showing the boom in the lowest position. The crane will handle 8000 pounds at a distance of 52 feet at 250 feet per minute.

structure is carried on six steel rollers or wheels, four in front where the heaviest load occurs, and two on the back. The front rollers are carried in a pair of steel equalizers. These rollers or wheels will be of steel of ample size arranged to rotate on roller bearings and placed so as to run on a circular track of about five-foot radius about a pivot pin. A babbitted casting free to rotate about the center pivot pin is attached to the base frame to hold the crane concentric with the center pivot pin and to transmit longitudinal and overturning loads from the revolving superstructure to the semi-portal.

The cab is composed of a steel framework covered with sheet steel. It contains the main parts of the hoisting, luffing and rotating mechanisms. The control of all motions is so located that the operator has an unobstructed view of the load at all times.

The hoisting and lowering mechanism includes a winding drum, driven through a jaw clutch and a train of spur gearing by a motor equipped with a solenoid brake and necessary control apparatus and miscellaneous parts.

The luffing of the boom is accomplished by a worm driven drum operated by the hoisting motor through a jaw clutch and gearing so arranged that the boom can be raised or lowered at the convenience of the operator. The pitch of the worm is such that no mechanical brakes are required to prevent the load from lowering; but, as an additional safety, a pawl is provided to lock the luffing drum in any desired position.

The slewing is accomplished by means of a motor operated through a train of spur and bevel gearing and a pinion meshing with the master gear attached to the semi-portal bridge. A powerful foot brake is provided on this mechanism having a latch, by means of which the brake can be locked for any desired fixed position of the revolving superstructure.

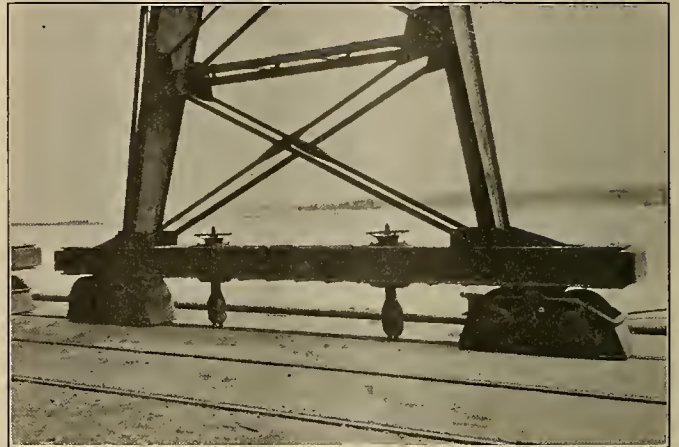
A motor for traveling the bridge is mounted on one of the girders of the semi-portal bridge. This motor is connected to the driven track wheels through spur and bevel gearing and line shafting. One truck on the wharf rail is driven and one wheel on the shed rail. A solenoid brake is mounted on the armature shaft extension. Control apparatus for traveling is located in the operator's house. Electrical connections between the conductors on the semi-portal bridge and on the revolving superstructure are made through collector rings mounted on the center pivot pin or an extension of same. In addition to the solenoid brake, hand operated rail clamps are provided.

The electrical equipment is designed for a direct current of 230 volts. The motors are of the following frame and horsepower:

1. Main hoist and luffing, 1—65 hp.
2. Slewing, 1—15 hp.
3. Bridge travel, 1—25 hp.

In connection with the clutch shifting lever which engages the hoist and luffing gearings with the driving motor, there is an interlocking switch mechanically operated. When the clutch shifting lever is in central or neutral position, with both clutches disengaged, this switch prevents the operation of the motor.

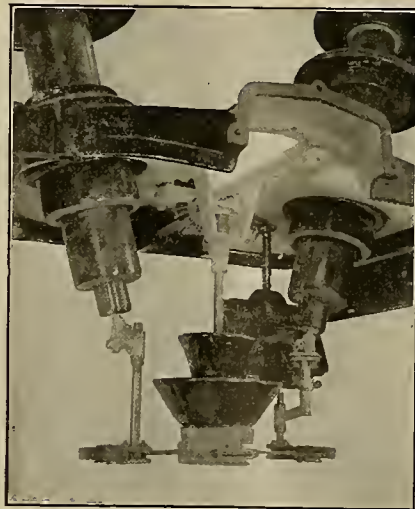
The slewing motor is controlled by a magnetic switch reversing plugging controller, consisting of a control panel, heavy duty, cast grid resistor and a vertical handle master controller. The plugging feature incorporated allows the motor to be reversed from full speed in one direction to full speed in the opposite direction without exerting over approximately 180% full load torque.



View showing the trucks and rail clamps of the semi-portal bridge type wharf cranes. The bridge can travel along the wharf at the rate of 200 ft. per minute. Hand operated rail clamps are provided, in addition to a solenoid brake, which clamps the wharf rail to hold the bridge in any fixed position.

CIRCUIT BREAKER

A 66-kv. circuit breaker manufactured by the Pacific Electric Manufacturing Company of San Francisco, and illustrated



Interior of one unit of a 66-kv. circuit breaker with special large clearances, and bevel gears turned by a square shaft made in sections

in a recent folder, is designed with special large clearances, substantial insulation, and light rotating members operated by bevel gears. Another feature is the square shaft which turns the bevel gears; this is made in sections, a device which makes alignment a simple detail.

Books and Bulletins

Oil Pipe Lines

"Oil Pipe Lines of the Yarhola Pipe Line Company" is the title of a very attractive pamphlet recently issued by Sanderson & Porter, engineers, of New York, Chicago and San Francisco. The pamphlet describes an eight million dollar oil pipe line project constructed by California engineers, using California methods and employing California men, in the Mid-Continent oil fields for the Shell interests.

The excellent photographs and good printing, as well as the interesting reading matter give this little booklet considerable distinction.

Copies may be obtained by addressing Sanderson & Porter, 14 Montgomery Street, San Francisco.

National Electrical Safety Code

The Bureau of Standards has sent out copies of Section 9 of the National Electrical Safety Code—rules covering protective grounding of circuits, equipment and lightning arresters for stations, lines and utilization equipment—showing changes in the text which have been proposed for incorporation in the Third Edition, soon to be published. The proposed changes in Parts 1 and 3 have already been distributed for criticism. The proposed changes in Part 2 will be distributed as soon as possible.

Drum Controllers

C-H Drum Controllers is the title of a new four-page, two-color 8½ by 11 folder, which has been prepared by The Cutler-Hammer Manufacturing Company, Milwaukee. It gives prominence to three outstanding features of C-H Drum Controllers—accessibility, interchangeability of parts and interchangeability of methods of manipulation. Any C-H standard stock drum can be equipped with either rope, radial or straight line drive and these are interchangeable. The folder plays up other points, such as the ease with which the fingers and the cylinders may be removed; the absence of wood in construction; the square metal shafts, and the straight non-stubbing fingers. Dimensions, ratings and other engineering data are given.

The folder has been prepared especially for the St. Louis convention of the Association of Iron & Steel Electrical Engineers but is also being forwarded to those interested in drum controllers.

Proceedings and Reports

The American Society of Civil Engineers has published the Proceedings of the Society for the months of August and September, 1919.

The "Transactions" of the Illuminating Engineering Society, Vol. XIV., No. 6, has recently been sent out.

The Hydroelectric Power Commission of the Province of Ontario issues volume 3 of its eleventh annual report, covering activities for the year ended October 31, 1918.

"Profit Sharing" is the title of a recent address before the National Civic Federation, now printed in pamphlet form.

Bureau of Mines

Prominent among the Bureau of Mines publications is an artistic booklet describing the new Pittsburgh Experiment Station. It is fully illustrated with distinctive photographs, and contains much interesting descriptive matter.

"Electrodeposition of Gold and Silver from Cyanide Solutions" is the title of Bulletin 150, recently issued, and including a full analysis of extensive experiments. The author is S. B. Christy.

Bulletin 178-B is "War Minerals, Nitrogen Fixation and Sodium Cyanide," by Van H. Manning. This is an advance

chapter from Bulletin 178—"War Work of the Bureau of Mines."

Among excerpts from the monthly reports on mineral investigations of the Bureau of Mines come papers on major metals—iron, copper, zinc, lead, gold and silver; on talc and soapstone; on the preparation of Fuller's Earth; and on coal. A preliminary report on potash is also issued—"The Potash Industry of the United States and Its Possibilities for Future Production," by Arthur E. Wells.

Following upon numerous inquiries, the Bureau of Mines has prepared a paper entitled "Notes on the Oil Shale Industry with Particular Reference to the Rocky Mountain District," with a comprehensive bibliography on the subject. Copies of the paper may be obtained by addressing the Bureau of Mines, Washington, D. C.

The following list is a summary of the new publications of the Bureau of Mines for the month of September, 1919:

Bulletin 168—Recovery of zinc from low-grade and complex ores, by D. A. Lyon and O. C. Ralston. 1919. 145 pp., 23 figs.

Bulletin 178-B—War minerals, nitrogen fixation, and production of sodium cyanide, by Van H. Manning. 1919. 61 pp.

Bulletin 178-C—Petroleum investigations and production of helium, by Van H. Manning. 1919. 87 pp.

Bulletin 178-D—Explosives and miscellaneous investigations, by Van H. Manning. 1919. 23 pp.

Technical Paper 220—Burning steam sizes of anthracite with or without admixture of soft coal, by U. S. Fuel Administration. 1919. 8 pp.

Technical Paper 222—Method of administering leases of iron-ore deposits belonging to the state of Minnesota, by J. R. Finlay. 1919. 40 pp., 1 fig.

Technical Paper 225—The vapor pressure of lead chloride, by E. D. Eastman and L. H. Duschak. 1919. 16 pp., 2 pls., 2 figs.

Diesel Engines

The latest bulletin of the Dow Pump and Diesel Engine Company of Alameda, California, is an excellent twenty-page booklet on the Dow heavy duty full Diesel type marine oil engine, and contains in addition to photographic illustrations a number of highly detailed line drawings. Charts showing efficiency, economy and so forth are also included.

The cover design deserves special mention; it is one of the most attractive we have seen for some time.

Annual Report

The Hydro-Electric Power Commission of the Province of Ontario has issued Volume 2 of its eleventh annual report, covering activities for the year ended October 31, 1918.

Sales Helps

The Hotpoint division of the Edison Electric Appliance Company, Inc., of 5660 West Taylor Street, Chicago, has issued an effective broadside for dealers, urging early orders of fall and Christmas stock of Hotpoint appliances and announcing forthcoming holiday window displays. Reproductions of recent advertising are enclosed in the folder.

Technical Books

A selected list of Technical Books of 1918, compiled by Donald Hendry, head of the Applied Science Reference Dept. of the Pratt Institute Free Library, Brooklyn, N. Y., is now ready for distribution.

Electrical Testing

A well arranged and valuable booklet is sent out by the Wagner Electric Manufacturing Company of St. Louis, under the title "Manual of Electrical Testing." This booklet is a revision of one published by the company some years ago and was very favorably received.

Motors and Pumps

Of two catalogs recently sent out by the Allis-Chalmers Manufacturing Company, of Milwaukee, Wis., one describes the details of Allis-Chalmers Oil Engines, Diesel type, to facilitate the ordering of spare parts, and the other the centrifugal pumps and pumping units built by the company. The latter booklet has an especially artistic cover in a sepia design. The reading matter includes among other things friction tables and instructions for installing and operating horizontal centrifugal pumps.

NEW ELECTRICAL DEVELOPMENTS

(News from the Northwest features interesting corporation items and new installations. The Pacific Central District and the Pacific Southwest report extensive irrigation projects and many city improvements, while the Inter-Mountain region shows great activity in the extension of power lines and the application of electricity to industrial undertakings.—The Editor.)

THE PACIFIC NORTHWEST

PORTLAND, ORE.—Portland Gas & Coke Company, St. Helen's Road, is to erect a \$3000 power house.

ASTORIA, ORE.—The Pacific Power & Light Company has started work on its new station. Large oil turbines are to be installed.

SEATTLE, WASH.—The city council has appropriated \$19,000 to buy motor trucks for the city light department and \$20,000 to finance construction.

SPOKANE, WASH.—F. E. Martin is to erect a new power house at the Edgecliff sanatorium, the contract price being \$21,110, awarded by the county commissioners.

CHEHALIS, WASH.—Property owners of the new street lighting district will be asked to petition for a new improvement district under the law, estimated cost of the change being \$10,000, the city to furnish the lights.

HOQUIAM, WASH.—Bearing the signatures of more than two-thirds of the necessary property owners along the streets affected, petitions have been submitted to the city commission for an improved lighting system on Eighth and I streets.

SEATTLE, WASH.—Thompson & Castleton, 316 First Avenue South, Seattle, are installing 600 horsepower in motors for the Ferry-Baker Lumber Company of Everett, Washington, also an electric crane for the same company. They are installing about 500 horsepower in electric motors for the Everett Flouring Mill, the property of the Portland Flouring Mills Company. The mill is being remodeled and electric power installed.

CHEHALIS, WASH.—The Washington-Idaho Light & Power Company has filed a bill of sale conveying its Chehalis interests to the Sherman County Light & Power Company of Oregon. A. Welch, Portland promoter, signed the papers as manager of the first-named corporation. Last April the city voted the Welch company a franchise for a duplicate light and power plant here but the option to operate under it has never been exercised.

SEATTLE, WASH.—The Hillman Engineering & Sales Company has been incorporated by the C. Kirk Hillman Company interests at Seattle. The old company which handled electrical machinery has been succeeded by a much more comprehensive organization which is exporter, importer and distributor for leading manufacturers of the United States. The new company will handle equipment for factory, forest, farm, mill, mine, home, highway, dock, ship and shipyards, including motors, alternators, transformers, converters, instruments, hoists, cranes, tractors, turbines, engines, winches, lighting plants, textile machinery, etc.

SEATTLE, WASH.—The bids for the hydro-electric machinery asked by the board of public works were received on October 3rd. The estimate of the lighting department of the cost of this machinery, which when installed will add 10,000 kw. to the output of the Lake Union steam plant, was \$588,160 and the low bidders, Allis-Chalmers Manufacturing Company and Charles C. Moore & Company, both with local branches, submitted combined proposals to furnish the entire equipment at \$561,699. Superintendent of Lighting J. D. Ross will compile the detailed bids and make his recommendations to the board. Bids are considered very satisfactory.

ROSEBURG, ORE.—Mayor W. S. Hamilton has completed the location of a power site on

the North Umpqua river above Rock creek, and a plan of the territory which shows the location was also filed at the state engineer's office at Salem and will be placed on record. The survey was made by Ford Frearer, city engineer, and corners set as provided before making application. Location of the dam was placed above the larger falls. The plan contemplated by the mayor is to have the power first directed to furnish energy to pump the city's water supply. The estimated cost of the plant contemplated by the mayor is considerably less than \$500,000, and it is believed the amount will be agreed upon by the voters.

THE PACIFIC CENTRAL DISTRICT

CORCORAN, CAL.—Manager J. B. Carter states that the San Joaquin Light & Power Corporation will soon spend \$80,000 in improvements on the local system.

VALLEJO, CAL.—On October 1st bids for the construction of an electrical power station for the Mare Island Navy Yard were opened. It is estimated that the plant will cost approximately \$25,000.

SAN FRANCISCO, CAL.—The Herzog Electric & Engineering Company has been incorporated here with a capital stock of \$55,000, by Katherine G. Herzog, G. H. Smith, M. E. Wise, J. L. Lawrence and H. C. Toumey.

FRESNO, CAL.—A petition is to be presented to the Supervisors of Fresno County asking for the formation of a new irrigation district to be known as the Foothill Irrigation District, situated in the counties of Fresno and Tulare.

WOODLAND, CAL.—Two-inch gas mains, instead of four-inch pipe, as was at first announced, are being placed in First street by the Pacific Gas & Electric Company. Larger mains will probably be laid in College or some other street, to be determined later.

MODESTO, CAL.—The board of directors of the Modesto Irrigation District are expected to fix the irrigation tax rate for the coming year at \$4 per hundred, the limit allowed by law, unless an increase is permitted through a special election, when they hold their next regular meeting.

REDDING, CAL.—This city is now a relay and repair station of the Western Union, becoming one of two breaks in the circuit between Portland and San Francisco. The Ashland relay office, heretofore the only one between the Oregon and California seaports, has been abolished, and Redding and Grants Pass are substituted.

NEVADA CITY, CAL.—The city trustees have authorized the completion of the purchase of the Little Idaho ditch and water system, which was taken under option five years ago. The city will pay \$5000 for the system, which is used during the stormy period and saves the city several thousand dollars each year.

MARTINEZ, CAL.—The Board of Supervisors adopted a resolution declaring the proposed Byron-Bethany irrigation district to be a necessity. The district is an enlargement of the present Byron-Bethany district and is being formed under the Wright Act. It will include the town of Byron and many thousands of acres in that locality.

OROVILLE, CAL.—As the result of promises made some weeks ago by John A. Britton, general manager of the Pacific Gas & Electric Company, a large pressure pump was installed to the water pipes of this city. The pump

greatly increases the water pressure and according to Fire Chief Sadowski, removes to a large extent the probability of destructive fires.

SAN FRANCISCO, CAL.—At a meeting of the board of trustees of the Northwestern Electric Company held recently Quarterly Dividend No. 18 of \$1.50 a share was declared payable October 1, 1919, on preferred shares of stock outstanding as of record at close of business September 24, 1919. This is at the rate of six per cent per annum.

OAKDALE, CAL.—Immediate improvement of the head works of the two irrigation districts was determined upon at a special meeting of the directors of the Oakdale and South San Joaquin irrigation districts. The cost of the concrete lining and enlargement provided in this year's plans will be but \$25,000, of which Oakdale's share is only \$4,000.

LIVE OAK, CAL.—Ned C. Steele, former employe of the Pacific States Telephone & Telegraph Company, has purchased from Daniel A. Hedger, the Live Oak telephone system, including a building and lot, 40 miles of rural lines and equipment.

OROVILLE, CAL.—In a letter received by the Butte County Board of Supervisors from State Engineer W. F. McClure, the Honcut-Yuba irrigation system is approved and permission granted to submit the matter to the voters of the district for a decision. The next step will be the publication by the Board of Supervisors of a notice fixing a date for a final hearing upon the boundaries of the two districts.

LINDSAY, CAL.—Bills are being mailed from the office of the secretary of the Lindsay-Strathmore Irrigation District, calling for payments of \$6 per acre foot for the water delivered to members for the irrigation season which closed August 30. This is \$1 per foot in excess of the estimate made at the opening of the season. The increase is largely accounted for by the raise in rates allowed by the Railroad Commission to the Mt. Whitney Power & Electric Co.

CHICO, CAL.—Formation of a mutual water company by purchasers of irrigable portions of the Stanford University ranch at Vina, who received their shares of Deer Creek water with their land, was projected at a meeting of Stanford ranch owners held in Vina. A committee was named to draw a draft of the organization and present it to all interested. It is the opinion of the owners that the water may be used more efficiently if administered by one head.

OROVILLE, CAL.—Construction camps are now being built by the Great Western Power Company in the outskirts of Oroville, preparatory to construction of a second tower line through this section extending from Las Plumas to San Francisco. The new line is being built in anticipation of the completion of the Caribou plant near Belden, which is expected to generate power the latter part of 1920. The new line will be the same as the present one, having steel towers imbedded in concrete.

SONORA, CAL.—The Southern Tuolumne farm center is working on a plan for a water supply and system that will be ample to irrigate between 9,000 and 10,000 acres of land in and around Groveland, Big Oak Flat and Deer Flat. Of the land that will be within reach of the system about 3000 acres are now cleared. Arrangements are being made to have an irrigation expert come from the State University in the near future to make a personal survey of

the district, to help in perfecting the plans and to make suggestions as to the best method of procedure for accomplishing the desired results. The Sonora farm center has a similar plan under way, and it is believed that the county's water problem will eventually be fully solved.

RICHMOND, CAL.—A delegation of business men met with the city council to discuss the plan of lighting the business streets of the city with electroliers. It has been proposed to place the electroliers on Washington avenue, Richmond avenue, Macdonald avenue and Barrett avenue. The chief matter of debate was the plan to be followed in paying for the electrolier system once it is installed. Some declared the city should stand the expense and others that the cost should be paid by property owners on the streets lighted.

OAKLAND, CAL.—If the demands of 1100 carmen for an increase in wages from 42 to 48 cents an hour is granted by the San Francisco-Oakland Terminal Railways and by the Key Route systems, it will be necessary, according to officials of the former company, for the corporation to request the Railroad Commission for another raise in fare. The company officials point out that a six-cent fare at the present time is inadequate to produce enough revenue to meet the demands of the men, which they say, call for the expenditure of approximately \$1,260,000.

MADERA, CAL.—The Hatch and Sevice land holdings, comprising many thousands of acres, have been signed up for the proposed irrigation project, now well under way by the committee in charge. The petitions are in circulation throughout the county, some districts having made rapid strides in securing indorsements. It is possible that the petition will be presented to the supervisors at the October meeting. All doubt as to the failure has long since been thrown to the winds, and the project that will bring Madera county to the front is now assured. Already land holders are planning ahead on their water system. Since actual preliminary work has started many investors have come to Madera; one representative is seeking 4,000 acres on which to bring families direct from Holland.

PORTERVILLE, CAL.—With 426 shares of stock out of a total of 480 represented at the adjourned meeting of the South Tule Independent Ditch Company at the South Tule school house, those present voted unanimously to increase the capital stock of the company from \$24,000 to \$96,000 and proceed with plans for the building of a dam which the engineers have estimated will cost about \$70,000. The directors of the company, John Larson, president, E. A. Fisher, Lucien Schmittou, Wallace Witt and John Hinkle, were instructed to arrange for the changing of the by-laws so that the company may be bonded for \$70,000 or whatever it will cost to build the dam and cement the ditches. The directors are to call a special meeting in about 60 days at which time changes in the organization will be completed.

SAN FRANCISCO, CAL.—The Great Western Power Company has announced that work is to be started immediately on the construction of a steel tower transmission line from Caribou, in Plumas county, to Oakland, via Brighton, to cost \$2,500,000. The line will be 195 miles in length, and will parallel the present transmission line from the Big Bend power plant near Oroville, to Brighton and thence west and across the Sacramento river. It will then follow the Oakland and Antioch Railroad 25 miles, crossing the Carquinez Straits at a height of 206 feet above the water, with a span of 5000 feet. Construction camps are being established near Oroville. The new line is being built to carry 150,000 volts of electricity from the company's new power plant now under construction at Caribou. It is expected to have the plant and line in operation within a year's time.

SAN FRANCISCO, CAL.—The new name of the Oakland-Antioch system, which embraces

the Oakland & Antioch, the Oakland, Antioch & Eastern, and San Ramon Valley railroads, will be the San Francisco and Sacramento Railroad. The articles of incorporation of the company bearing that name were filed by Steinhart, McAtee & Levy, for the reorganized road. The directors for organization purposes are: Joseph H. Steinhart, S. J. McAtee, of San Francisco; H. A. Mitchell, Oakland; S. P. Westington, Alameda; L. L. Levy, San Francisco; S. T. Maar and H. J. Sutherland, Oakland. The capitalization of the new company is \$5,500,000, divided into \$100 a share, of which \$1,500,000 are cumulative preferred 6 per cent stock and \$4,000,000 common stock, all non-assessable. The preferred stock is subject to redemption at \$110. Of the amount \$110,000 was actually subscribed for the incorporation purposes. The sale of the road under the mortgage will take place October 22, when the reorganization will be complete.

THE PACIFIC SOUTHWEST

LOS ANGELES, CAL.—The Rivers Irrigation Co. has been incorporated here with a capital stock of \$100,000, by V. E. Stockwell, F. L. Gilman, J. R. Wilson, Annie L. Steen and A. J. Riley.

FILMORE, CAL.—The board of trustees will call a special election to vote on a bond issue for the purpose of construction of a water supply system, including wells, pumps, pipe lines, reservoirs, etc.

RIVERSIDE, CAL.—The general offices of the entire Eastern Division of the Pacific Electric will be moved from San Bernardino to Riverside. There is also a possibility of shops being moved here shortly.

LOS ANGELES, CAL.—Sealed bids will be received by the Board of Public Works for installation of conduits for ornamental lighting of Broadway between 10th and 11th streets and 12th and Pico streets.

LOS ANGELES, CAL.—An All-American Canal to cost about \$30,000,000 which would irrigate over 200,000 acres of Imperial Valley land, was the suggestion made by A. L. Sonderegger at a recent meeting of the Engineers and Architects' Association.

SAN DIEGO, CAL.—The city council announces that construction work on the Barret dam site will be started at once. It is reported that the San Diego Clearing House banks will not finance the Barret dam as at first announced and a bond election will be called by the council for providing the sum of \$1,000,000.

LONG BEACH, CAL.—Ordinance B-629 has been passed by the council, granting the Pacific Electric Railway Co. a franchise to construct a double track and single track electric railway over streets adjacent to and in the vicinity of the channel of Los Angeles County flood control district, between Anaheim street and Ocean.

RIVERSIDE, CAL.—Fifty ranchers of the Moreno Valley, large and small, are organizing a mutual water company for the purpose of bringing the water from the water-bearing land in the San Timoteo Canyon into the Moreno Valley. A deal has been completed whereby this company has taken over the 1500 acres of the El Casco Water Company near Redlands, at a cost of \$250,000. It is believed that the greater part of the money can be raised from the sale of stock to the ranchers of the valley.

THE INTER-MOUNTAIN DISTRICT

DEWEYVILLE, UTAH.—Construction work is now under way by the Utah Power & Light Company to furnish this community with electric service.

SALT LAKE CITY, UTAH.—An order issued by the Public Utilities Commission authorizes the Bear River Telephone Company to increase its toll rates.

IDAHO FALLS, IDA.—Representatives of the Utah Power & Light Company will meet a committee from New Sweden early in October to discuss the possibility of extending electric service to that district.

HARDIN, MONT.—The Hardin electric plant has been sold by the Hardin Electric Company to F. V. B. Collins of Forsyth, Montana, at the price of \$35,000.

DUBOIS, IDA.—The Ashton-St. Anthony Power Company has a large force of men working out of Dubois, bringing their power line from Hamer to this city.

OGDEN, UTAH.—The merchants of this city are formulating plans for lighting the rear of all store buildings in the business district as a means of protection from theft.

BOISE, IDA.—The Ashton-St. Anthony Power Company has made application to the Public Utilities Commission for permission to extend its transmission lines into the town of Drummond in Fremont county.

RIRIE, IDAHO.—Claiming that there is insufficient business to justify an extension to this town, the Utah Power & Light Company has asked the Public Utilities Commission for a rehearing of the recent request of the Commission to make the extension.

LOGAN, UTAH.—Arrangements have been made by municipal authorities to secure current from the plant of the Utah Power & Light Company in Logan canyon to take care of increased load, the city plant not being able to furnish enough current to take care of present demands.

SALT LAKE CITY, UTAH.—Plans are being discussed for the illumination of the large concrete U on the mountain-side to the east of this city. The big U is the emblem of the University of Utah and is given an annual bath of white-wash. If properly lighted the U can be seen for miles at night.

EUREKA, UTAH.—The greater value of electric drive for various mining operations is evidenced by the fact that most of the mining companies in this district are making rapid strides toward complete electrification of their equipment. Practically all of the new companies are so equipped throughout.

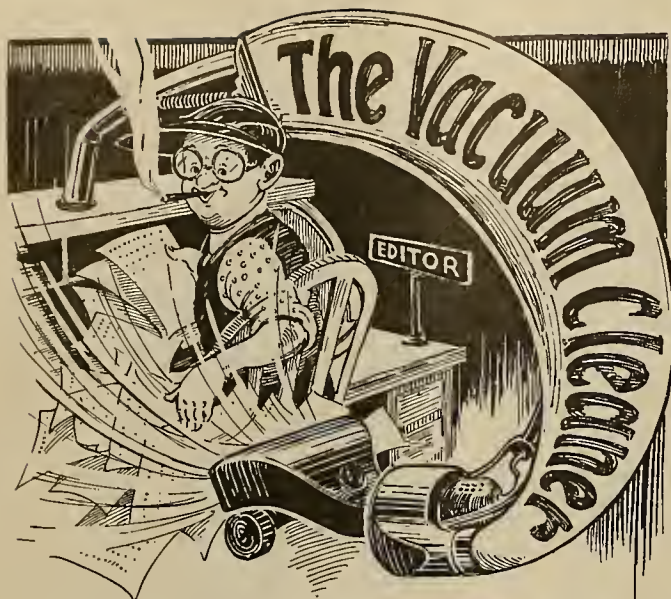
LOGAN, UTAH.—George Q. Rich of this city has filed an application with the state engineer for the use of 25 second feet of water to be taken from Logan river and delivered through a channel 1782 feet long to power wheels under a head of 125 feet. It is the intention to generate electricity for lighting and power purposes.

MILLVILLE, UTAH.—This city has recently completed the building of an electric distribution system for the town, and city officials are now considering the question of whether they will purchase current at wholesale from the Utah Power & Light Company or sell or lease the distribution system to that company, allowing them to operate and maintain the system, serving each customer direct.

SALT LAKE CITY, UTAH.—The value of electricity in the home will be shown in the Utah Power & Light Company's exhibit at the Utah State Fair commencing October 6th. The interior of a five room house has been arranged in which will be placed the proper electrical equipment for each room. Practical use of each appliance will be demonstrated by the company's salesmen during the Fair.

SALT LAKE CITY, UTAH.—A certificate of convenience and necessity has been granted by the Public Utilities Commission to the Dixie Power Company, authorizing the erection of a generating plant about twenty-one miles from St. George, on the Santa Clara river. The company furnishes St. George and surrounding territory now, but desires to enlarge its facilities to take care of increased business.

SALT LAKE CITY, UTAH.—The Intermountain Electric Company, one of the leading jobbers in the intermountain districts, has commenced the erection of a commodious five-story structure just east of its present location, to take care of the rapid growth of its business. When completed, the company expects to have one of the most completely equipped electrical manufacturing and automobile service departments in the West. The building will probably be ready for occupancy by January first.



The man in the street, who is frequently a poet as well as other things, will doubtless appreciate this rendering of the philosophy inspired by S. M. Kennedy's famous paper:

THE FELLOW IN THE STREET

By Richard E. Smith

A little book was written, with epigrams replete,
Urging full consideration for the fellow in the street;
Not the hobo or the vagrant who has naught to wear or eat,
But the everyday consumer, buying eggs and bread and meat.

In this book we read that arrogance leads surely to defeat,
The man who can't rub shoulders soon is lost in his conceit.
"To do as we'd be done by" in all dealings—what a treat!
Philosophy for all of us—this "Fellow in the Street."

Put some sunshine in your accents when a customer you greet,
Have offices wide open, for you practice no deceit;
In stores, garage and power house have every corner neat
For the little things are noticed by the fellow in the street.

A friendly word well spoken counteracts the summer heat,
A little human kindness makes a sourish person sweet;
Forget your indigestion when you go back on your beat
And show a friendly feeling for the fellow in the street.

* * *

The English language is a snare and a delusion, but the War Risk Insurance Bureau at Washington takes an unholy delight in the fact. The following extracts from letters received by that department from wives and relatives of men in the service have been reprinted in several publications, but we think that they justify one more repetition:

"You ask for my allotment number. I have four boys and two girls."

"Please correct my name and I could not and would not go under a consumed name."

Extract from a letter from a boy to his mother: "I am writing in the Y. M. C. A. with the piano playing in my uniform."

"Please return my marriage certificate, baby hasn't eaten in three days."

"Now, Mrs. Wilson, I need help bad, see if the president can't help us."

"We have your letter. I am his grandmother and grandfather and he has been kept and bred up in this house according to your instructions."

"I was discharged from the army for goitre which I was sent home on."

"Dear Mr. Wilson, I have already written to Mr. Headquarter and received no reply, and if I don't get one I am going to write to Uncle Sam himself."

"I am a poor widow and all I have is in the front."

"I ain't received no pay since my husband has been gone from nowhere."

"You changed my little girl to a boy. Will that make any difference?"

"I ain't received my husband's pay, and will be forced to lead and immortal life."

"Please let me know if John put in an application for a wife and child."

"As I need his assistance to keep me enclosed (in clothes.)"

"Owing to my condition which I haven't walked for 3 months for a broke leg which is No. 75. Kind sir or she."

"I enclose lovingly yours."

"I am left with a child seven months old and she is a baby and can't work."

"I received \$71 and I am certainly provoked tonight."

"Your relationship to him? Answer: Just a mere ant and a few cousins."

The power of prayer has been applied to all sorts of things but somehow our circulation department does not seem to respond to absent treatment. A letter arrived recently from one of our subscribers requesting that his Journal of Electricity be sent to a new address. Pinned to the letter was a printed slip bearing the words "PRAYER CHANGES THINGS." We presume our subscriber had been trying to find out if it would change addresses.

* * *

The "Californiac" seems to have a converse. We quote him from the San Francisco Chronicle:

"The Californian gets up at the alarm of a Connecticut clock; buttons his Chicago suspenders to Detroit overalls; washes his face with Cincinnati soap in a Pennsylvania basin; wipes on a Rhode Island towel; sits up to a Grand Rapids table; eats Kansas City meat and Minneapolis flour with Idaho potatoes cooked with Indiana lard on a St. Louis stove burning Wyoming coal; puts a New York bridle on a Colorado bronco fed with Iowa corn; plows five acres of land (covered with Ohio mortgages) with a Chattanooga plow. When bedtime comes he reads a chapter from the Bible printed in Boston; says a prayer written in Jerusalem, crawls under a blanket made in New Jersey, only to be kept awake by fleas—the only home product of his own state."

Residents of Los Angeles please note that the bed is not necessarily located in San Francisco.

* * *

The electric furnace is being more and more widely used as anyone can see who reads the Journal of Electricity. However we think this enthusiast takes the prize—even though his devotion is not entirely disinterested, as indicated in the last two lines:

"To be buried in a furnace,
I hope will be my fate,
So that my bones may mingle with
The ashes of the grate."

* * *

The 'overworked dairyman as pictured in the following pathetic biography is one of the strongest arguments we have seen for the electrification of the farm. A city investigator of the high price of milk was rash enough to make the following statement:

"Dairy farmers need not labor more than thirty minutes morning and night, only when they are milking."

The defender of the dairyman replies with this:

"We suppose the rest of the time all he has to do is to clean out the stable, carry in a few hundred pounds of feed, mix some chop, spray the cows, drive them to and from pasture, fix the gates, whitewash the barn, run the separator, cool the cream, feed the pigs, gather the eggs, teach the calves to drink skim milk, plow a few fields, cultivate his crops, cut his hay, bind his grain, haul his produce to town, haul feed back at \$60 a ton, put up some new fences, fix his gates, weed his garden, fight his gas engine, cut thirty cords of wood, bury a dead cow, dig a few hundred post holes, drive the neighbors' cattle out of his grain, do his chores and milk twenty more head of cattle night and morning that he couldn't milk within the thirty minutes set aside for milking."

Any dairyman we know would pay \$75 to \$100 a month plus board and lodging to any of these New York critics who can stack up alongside of the dairyman for twelve to fourteen hours a day. The price of milk will have to go higher yet before the dairyman can make anything like a decent living by working only ten hours a day seven days in the week"

* * *

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JOURNAL OF ELECTRICITY

VOL. 43 NO. 9

SAN FRANCISCO, NOVEMBER 1, 1919

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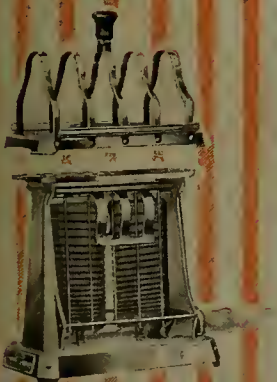
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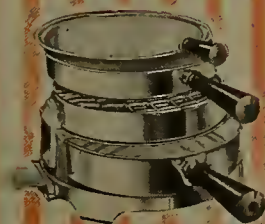


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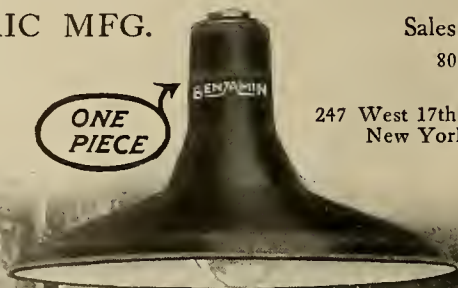
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JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

VOLUME 43

SAN FRANCISCO, NOVEMBER 1, 1919

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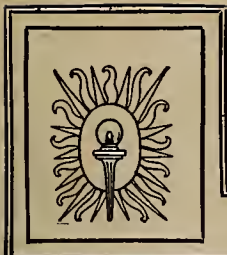
ARTHUR H. HALLORAN
Secretary



FOREIGN TRADE CONVENTION, 1920

The year 1920 will be a significant one for the electrical and engineering interests of the Western coast of the United States and of the great countries which border the Pacific. On May 12-15 of that year the Foreign Trade convention, which is the important event of the international commercial year, will convene in San Francisco. Special ships are to be run from the various important Pan-Pacific ports, bringing representatives to this convention, and the Journal of Electricity throughout the year will feature articles of commercial and engineering interest to those who are engaged in the development of the Pan-Pacific area and in promotion of this great convention in 1920. The important position which the West is to take in the Pan-Pacific commerce of the next few years is in large measure

dependent upon the development of its electrical resources which will shortly make possible extensive manufacturing enterprises to care for the raw materials of our Pan-Pacific neighbors. The problems of the West and of the developing region of the Pacific are in much so similar that they are drawn closely together in cordial cooperation. The beautiful Civic Auditorium of San Francisco, here shown as it was electrically flood-lighted on the occasion of the recent California Land Show, will probably be the scene of this great convention where the West will welcome the representatives of American industry who gather more firmly to cement the friendly commercial and engineering relations between America and our foreign neighbors.



JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC



Volume 43

SAN FRANCISCO, NOVEMBER 1, 1919

Number 9

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Without Vision the People Perish

IT is questionable if ever since the world began an industry offered such constructive vision to tired humanity as the vision of usefulness to the human race offered by men of the electrical industry today. The fires electrical kindled during hours of peril saved freedom to the world and its peoples by means of the method electrical in every sinew of war.

Are you in these thrilling days of readjustment keeping your own individual vision of bigger things before you at all times—a vision so all-encompassing as to banish the fear of making mistakes, the fear that would urge you not to attempt the bigger idea or the fear of criticism that may come from your fellows in case of failure?

With the bigger vision of usefulness ever before you courage comes, and never can it be said of our wonderful industry, "Without vision the people perish."

To the electrical industry in the West—vibrating with possibilities of development during the next score of years to a degree hitherto unexperienced in the accomplishments of industry—the matter of strong and sound leadership in Western Universities is of great present concern.

David P. Barrows
for University
President

Seven months have elapsed since the Journal of Electricity in its leading editorial of March 15, 1919, entitled "The University President—What Is Needed," pointed out in an impersonal manner the crying need for broad action in the matter of the selection of a man for the presidency of the University of California. Perhaps no editorial of the Journal of Electricity in recent years has received the widespread attention that has been accorded this particular editorial. Not only have a substantial number of our readers endorsed as individuals the broad sentiments expressed in the editorial, but engineering societies and local sections of national engineering societies have gone on record in favor of this editorial and its suggestions.

Through the months that have elapsed a crystallization of sentiment has been taking place regarding the man for this position. The result of this thought is being expressed on all sides. Briefly summarized it may be stated in the following words: Due consideration has been given to candidates from neighboring universities and men of the East. Local candidates have been carefully considered and when the final estimate is made of the best available man attention is being centered on David P. Barrows, of the University of California.

And why should not Dr. Barrows be the one man for the position? Here are the fundamental conceptions of our former editorial that have won such wide endorsement:

"The man to undertake such a task as that of the presidency of the University of California must be one familiar with the ideals of the Eastern civilization, yet whose very heart-throbs pulsate with the life-giving energies of our great West and what it has in its native values to offer of helpfulness to humanity. He must be a man of courage—a man of conviction—a man of vision—such characteristics may indeed be said to make up the scholar in the highest sense of the word."

To see how well Dr. Barrows measures up to these lofty requirements we have only to follow him again in his work at Pomona College, at California and at Columbia as a student, in the Philippines and Mexico as an educator, in the president's chair at Berkeley as acting president of the University of California, in the cause of humanity as a member of the Commission for Relief in Belgium, and again on the field of battle in the wilds of Siberia—as a soldier fighting in the cause of world freedom.

Finally, if there is a shadow of a doubt in your mind, hear him in one of his masterly expositions of the perils of the hour show how we must as citizens manfully face them, such as he recently delivered before thousands of California teachers in the Oakland Auditorium, and you will lose every possible sense of doubt that he, Dr. David P. Barrows, is the man of the hour for the presidency of the University of California.

Of vast significance is the Pan-Pacific Engineering Congress to be held at Weltevreden, near Batavia, Java, in May, 1920. This gathering of technical experts from all lands washed by the waters of the Pacific may well mark an epoch in the development of the Orient—for it is to the engineering problems of the Far East, particularly, that attention is to be devoted. That this will be an assemblage truly representative of the whole Pan-Pacific area may be judged from the assurance that delegates will attend from India, Japan, China, Australia, the United States and a score of other countries. Widespread interest is indicated by the fact that a full year before the opening date of the congress no less than 170 papers had been submitted on Asiatic engineering problems. The papers will be discussed in six main sections, and one important division relates to "industry and the production of energy." The scope of the conference, as shown by the published program, is very comprehensive; it ranges from water supply and radio telegraphy to aerial navigation and the study of volcanic phenomena.

With governmental support, and under the active management of the Netherlands Indies section of the Royal Dutch Institute of Engineers, the congress from the start appears assured of every success. Attendance at the gathering will not only mean access to a new and almost limitless field of engineering endeavor; it will give opportunity also to visit Siam, Straits Settlements, the Philippines, Ceylon, India and other interesting countries of the Orient. Java itself is one of the most entrancing of Pacific lands, and not only its majestic scenery and its jungle-covered ruins of antiquity, the work of master builders, will arouse the visitor to enthusiasm. Throughout the Malay archipelago there are signs of an awakening to tremendous industrial development, of the kind which appeals most strongly to the constructive imagination of the American engineer.

Forecasting all this, P. A. Roelofsen, Chief Manager of the Government Hydro-Electric Service of the Netherlands Indies, arrives in San Francisco early this month to make an inspection tour of industrial America. He is sent across seas to study water power developments, electric railroads, nitrogen industries and electric furnaces, especially those for the smelting of iron ore. This eminent technical authority will no doubt have much momentous data to lay before the engineering conference at Java, where the proceedings will be held in Dutch and in English—the great trade language of the Pan-Pacific area.

Never has America been so much visited as in this first busy year after the World War. Distinguished guests have crowded to our shores; we have even been privileged to welcome a royal entourage from heroic Belgium. Of particular significance have been the visitations by commercial and industrial missions from the war-

torn European countries. At the end of October a grand World Trade convention was held at Atlantic City, where American business men met together with eminent representatives of Britain, France, Italy and Belgium. All of these countries have immense industrial problems confronting them, both at home and in their dependent territories. France and Italy from now on will be obliged to produce more hydroelectric power because of the serious shortage of coal; Belgium must undertake vast new developments in the rich realm of the Congo to recoup domestic losses; Britain appears everywhere eager to expand her industrial system. Never was Europe in a more inspired frame of mind for gigantic engineering projects; the reclamation of the Zuyder Zee and the delving of the Channel Tunnel at last seem about to become realities.

It is to be regretted, therefore, that the delegates from abroad fail to visit our great Western states, where engineering enterprise is triumphing over obstacles such as the war-zone countries must also conquer in their reconstruction. Announcement has been made that the distinguished visitors will make a tour of "the industrial sections of North America," yet their program as outlined takes them no farther from Atlantic City than St. Louis. Unless their plans are changed, they are not to see the hydroelectric developments, the mines, the aqueducts nor the oil-fields of the West. Truly it is to be hoped that some at least of these visitors will be enabled to come to the Pacific Coast to observe these things.

A party of more than 200 commercial delegates from Switzerland, representing "The Swiss Mission for Economic Studies in North America," has recently completed a month's tour of various manufacturing establishments in this country—yet only one solitary delegate, to our knowledge, wandered to Pacific shores. In view of the immense dependence of Swiss manufactures upon water power, it would seem that the Swiss leaders of industry could find much of profit and interest in the hydroelectric developments throughout the West.

King Albert we have seen and greeted as a royal good fellow; and as ready a welcome is awaiting the business barons of Europe who shall choose to visit us. Our invitation goes out to them, "Come over across the Rockies." The West feels that it has much to offer; and for advice as to the wide extent of these offerings, Europe is referred to its friend Herbert Hoover—the most typical engineer of the West.

The electrical industry in the West finds itself today emerging from war activities to assist in problems of world readjustment in a situation so favorable as to mark this section of our nation as a leader in advanced thought in matters electrical. Vast transmission lines which stretch with record breaking voltages from Harlowton, Montana, on westward across Idaho, Washington and southern through Oregon and California to the Mexican border line—a distance of over two thousand miles—tell but faint words of this accomplish-

**The Mecca
for Advanced
Thought**

**Trade Missions
are Missing
the West**

ment and the many record-breaking feats that have thus been brought about.

But with this triumph in engineering accomplishment along physical lines—an accomplishment that has brought about a per capita use of electricity not even approached anywhere else in the world—there is today developed a vision in men of this district that is giving to the nation a helpfulness of the most timely and constructive nature.

The geographic section idea is here being worked out in an unusually helpful and efficient manner by the Pacific Coast Section, N. E. L. A., and the Northwest Electric Light and Power Association. Some conception of this efficient work may be gathered from other pages of this issue.

The California Electrical Cooperative Campaign has accomplished new attainments in bringing about a helpful and united industry in its internal relationship and in its open and frank dealing with the public.

Commission regulation, too, such as that of the California Railroad Commission, is proving broadvisioned and a stabilizing factor in utility securities.

Public Policy, under such able national leadership as that of John A. Britton of the Pacific Gas & Electric Company, is reaching all parts of the nation today in its helpful influence.

Executive administration of a great national electrical body under the presidency of R. H. Ballard, of the Southern California Edison Company, is indeed awakening new interest in every nook and corner of the nation.

There is just one way men of the nation can check up all of this splendid work and that is to come West next spring and plan to attend some one or all of the following big conventions: The World Foreign Trade Convention at San Francisco in April; the National Electrical Supply Jobbers' Association at Del Monte, California, in May; or the National Electric Light Association convention at Los Angeles in May. The eyes of the nation are focused Westward. We hope to greet you in 1920.

Practically the entire industrial world was put to task some years back when the word went abroad that an alternating current motor had to be designed with two possible speed relationships to meet the conditions of the electric drive in the rapidly developing oil fields of California. It is now a matter of history that at least two of the great electrical manufacturing concerns came forward at once and set about the solution of the problem. The net result to date is that so satisfactory has proven the design of the alternating current motor in the California oil fields that this type of drive is proving far more economical than any other known system, even outdoing those sources of

power directly derivable from burning the oil in its native haunts as a driving power.

Now comes upon the scene another crying need for alternating current motor design. The great agricultural centers of the West are in many instances served by hydroelectric power transmitted over long distances, consequently alternating current is alone available in many of these communities now rapidly growing into cities of no mean importance.

Fresno, California, is a striking instance of this and there is a growing demand for electric service for elevators in that city. The construction of several ten-story buildings is being contemplated. Why should not a satisfactory alternating current motor be designed to meet such pressing needs as this? If such alternating current apparatus can be made flexible so as to give the desired results a large investment in direct current lines and apparatus can be eliminated.

Since the days of Faraday and Maxwell much misunderstanding and considerable confusion have arisen over the necessity of the adoption of two separate and distinct systems of measurement—the electrostatic and the electromagnetic. With the next issue of the Journal of Electricity a magnificent series of discussions is initiated by Dr. A. C. Crehore, long known to students of electrical engineering as one of the authors of Bedell and Crehore's book on Alternating Currents. This new series will point the way to a common standard of measurement for electrostatic as well as electromagnetic measurement in addition to treating of a number of other subjects of intense interest connected with theories involved in the constitution of matter.

This series of easily understood discussions has been prepared by Dr. Crehore for the Journal of Electricity to fill a demand that seems certain to be created by the publication of Dr. Crehore's recent book entitled "A New Theory of the Atom." According to Dr. Crehore's statement in his preface to this series of articles, when the effects of the new expressions for Rydberg's constant and Planck's constant, connecting them in various ways with the electrical charge and the mass of nucleus of the hydrogen atom, are looked upon with the proper perspective, the appropriateness of the title of this series of articles, "The New Physics," which begins in the columns of the Journal of Electricity Nov. 15, 1919, is more and more manifest. The reduction of the two systems of units alone, the electrostatic system and the electromagnetic system, to one common system in terms of length and time, introduces us to a new era in physics. It is difficult to dismiss the thought that we are one step nearer to a satisfactory understanding of the nature of electricity and its intimate connection with the ether of space.

IN THE NEXT ISSUE: The Washing Machine Campaign and Plans for an All Electrical Christmas

Marking and Packing Shipments for Export

BY J. C. HARRAMAN

(The satisfactory service and consequent good-will which are so essential a part of successful foreign trade are very largely dependent upon the careful packing and marking of shipments. The troubles attendant upon careless packing, and the requirements of adequate service in this respect are here described by the traffic manager of the San Francisco & San Jose Transportation Company.—The Editor.)

The proper preparation of American merchandise for shipment to foreign countries is at present a subject of great interest to all of us.

Adequate and satisfactory packing for export is a most important factor in our foreign trade, and one which no doubt is already well known to the majority of those who have been long in the business. There will, however, always be newcomers in

Generally speaking, all containers enclosing shipments for export should be sufficiently substantial to withstand damage from ordinary handling in transit, and ordinary handling in transit of shipments for export differs according to their destination and the methods of transportation required. Many shipments, we will say, originate in the Middle West and move by rail to the coast, thence by steamer from which many times the cargo is lightered onto a barge, thence after reaching the land in this manner, are transported on the backs of men or animals, or perhaps on litters, dead axle wagons, or perchance railroads; and all this must be taken into consideration in packing—and the more kinds of transportation used, the greater number of transfers necessary which correspondingly affects the packing requirements. All those interested in exporting should study their maps and guides carefully and secure the information as to just what methods of transportation shipments to various destinations will undergo, and then pack their shipments accordingly.

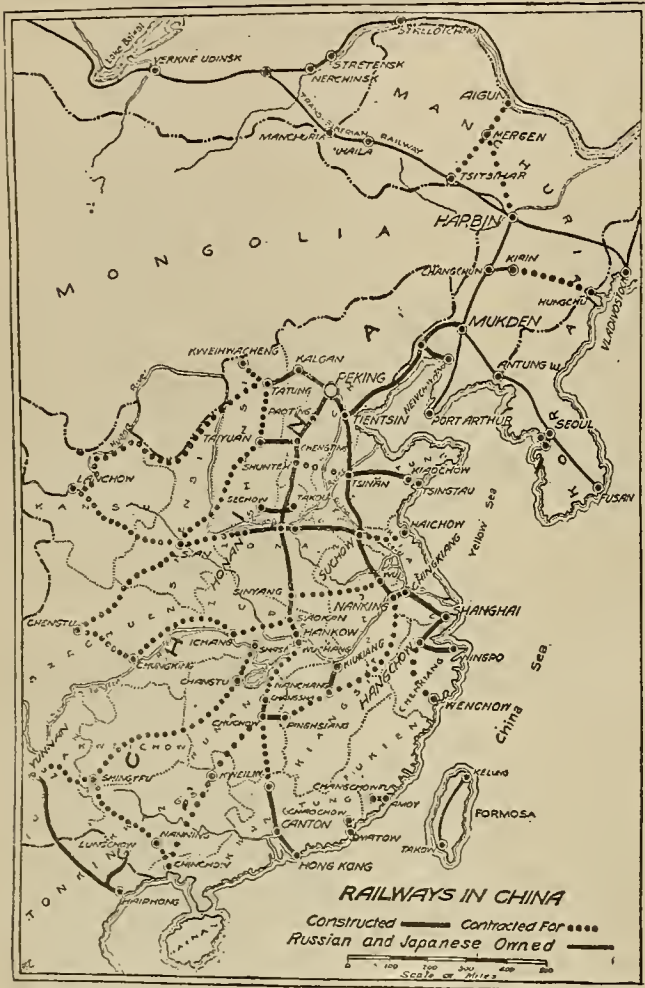
Shipments for export are necessarily subjected to frequent and rough handling and when improperly packed will, of necessity, arrive at their destination in bad condition. The loss or damage usually falls upon the consignee or upon the shipper, as the steamship company may disclaim responsibility under the clause "not responsible for breakage," which is to be found in all bills of lading, and may also claim that the goods were not in proper shipping condition when received by them, etc.

All merchandise, therefore, intended for shipment to foreign ports should be protected by a substantial boxing and should be securely packed. At the same time the packing should be as light in weight as possible, as duty is often charged on the gross weight of the package.

Following Instructions

So much depends on the manner in which goods are packed that the shipper is never safe in ignoring the requests of the buyer, no matter how trivial they may seem. For instance, if the buyer instructs the shipper that no package should exceed a certain weight or dimensions, it is likely that the goods have to be loaded on "mule back" for shipment to the interior. Should he request that the goods be packed in tin-lined cases it probably means that the cases are liable to be exposed to torrential downpours of rain or that the humid atmosphere of the country of destination would otherwise cause deterioration.

The buyer sometimes requests that only one kind of goods be placed in each package. Should the shipper fail to observe this requirement it might result in a heavy fine by the Customs authorities, as some countries will not allow the importation of different kinds of goods in the same package.



Vast areas in many parts of the world have but meagre railroad service, and the fact that they depend upon wagons, mules and so forth for transportation should always be taken into account by exporters in packing for shipment.

the field, and especially are these numerous just at this time—and to these newcomers the recorded experiences of the old timers will be of value, and the faults and mistakes called to our attention by consuls and commercial agents in foreign countries, which are matters of record with the Bureau of Manufacture of the Department of Commerce, are especially interesting and instructive.

Special criticism has been directed toward the packing of cotton, flour, cotton seed products, furniture and machinery.

The following statements on faulty and careless packing were prepared by an American consul of wide experience with a view of interesting the American manufacturer and exporter in this important feature of a successful export business with South America:

"It should be remembered that practically all freight for South America must be unloaded from the steamer into a launch or lighter in the open bay or roadstead, and then to the dock or pier, while the lighter is often in rough water. Thus goods are handled three or four times before they reach the Custom House from the steamer. All freight in this part of the world is handled roughly. This is to be regretted, but it is a fact that must be met if American interests are to succeed here.

"These conditions can be very largely overcome as is proven by English and other firms doing business there. They have learned that faulty and careless packing does not pay. In the first place, merchandise should be packed in medium-sized cases, say about three by two feet, where the goods are not too heavy. Where goods are packed in small boxes, as is the case with starch, catsup, malted milk, etc., the boxes should be strongly crated in packages about the size mentioned. Otherwise the small cases are put into the sling or net when being unloaded with heavier cases and are crushed, or a heavy case is allowed to fall upon them, with the same results. As a usual thing, these small wooden cases are made of half-inch boards, which are too light to be shipped without protection. Nothing short of inch stuff should be used for outside cases or crates, and this should be of tough wood. Brittle pine is almost worthless and should never be used. Then all articles contained in the case should be securely packed and fastened so that they cannot shake about in the case or rub or knock together.

"Furthermore, every case should be so firmly bound with strap iron that it would be difficult to remove a board. This is to prevent thieving, which may be practiced when boards can easily be pulled off and replaced.

"The buyer will gladly pay the additional freight charges to make sure that the goods arrive in good shape. Of course, the goods should be packed to occupy as little space as possible with safety."

Marking Packages

All goods must be distinctly marked with the port of destination, also routing. The marking of packages plays a more important part in export shipping than most American manufacturers are willing to believe. For instance, in shipping to several South American countries all the marks on the packages must be stenciled, brush marking not being allowed. Other countries require that the marks, numbers, etc., must be placed on two or more adjacent sides of the packages. Others again require the net and gross weights and kilograms on each package and a number which must correspond with the number of the package as given in the Consular documents. Failure to observe these regulations always results in fines, delays and annoyance at destination.

In connection with marking cases it is of the greatest importance that nothing but the shipping marks, such as appear on the invoice and the bill of lading, be put on the cases, otherwise the importer is liable to a fine. Frequently manufacturers use second-hand cases on which there are many old marks so that it is often difficult to make out the proper mark.

Some manufacturers have a weakness for stenciling or printing the contents on the sides of the cases, which they think will serve as an advertisement, whereas it serves principally as a guide to the man who is doing the pilfering and enables him to select the cases containing goods which he can most readily dispose of. This has been proved over and over again from the fact that certain manufacturers who do this "advertising" on their cases are more often robbed than others who have plain cases.

Protection of Valuables

Jewelry, revolvers, watches, silverware, etc., should always be packed in tin-lined cases, iron-strapped and sealed, whether this is required by the steamship company or not, and the value should always be stated on the bills of lading and receipts. The steamship companies usually issue a "special permit" for this class of goods, requiring delivery immediately prior to the sailing day. Goods of this character should never be shipped on a "Parcel Receipt" as the responsibility of the steamship company for loss, etc., is less on a shipment by Parcel Receipt than if covered by a regular bill of lading.

A steamship company or other carrier has a right to limit its liability for the loss of a package to a specific amount, unless the value of the package is declared at the time of shipment and freight prepaid according to value.

For the protection of goods both in transshipment sheds, on board steamers, and at the landing jetties, it is important that all cases, no matter what the contents are, should be strapped and sealed. This operation may take a little time and cost a small amount of money, but by doing so the shipper will find that he will have no claim for shortage and the buyer will receive what he has paid for, while otherwise he may find his cases containing half the goods he ordered and half rubbish, which the man who has stolen his goods has supplied in their place. The shipper can always protect himself by stamping on his shipping receipt and invoice "Cases strapped and sealed; see that the seal is unbroken before taking delivery; no allowance made for pilferage." If this system is followed, time, money and trouble will be reduced to a minimum.

In conclusion let me leave these thoughts of export packing and marking requirements with you:

- (1) Consideration of climatic conditions.
- (2) Consideration of customs charges as related to package.
- (3) Methods of transportation involved en route to destination.
- (4) Substantial boxing and crating to meet requirements, including strapping and sealing.
- (5) Clear and distinct marking.

Water Power in Siberia

BY V. V. TCHIKOFF

(The turmoil which has swayed Russia for the past few years has detracted attention from the peaceful possibilities of her rich territory. With more settled conditions the need will arise for rapid development, and the following survey shows the extensive water power resources which are available for this development. The author is a consulting engineer in reclamation and water power and was formerly consulting engineer for the International Bank in Petrograd. He is at present organizer and publisher of the United States Industrial Encyclopedia.—The Editor.)

Siberia, almost twice as big as the United States, is a country of rather rare rich natural resources, in the development of which the water power will play an important role.

Unfortunately, no special investigations concerning water power in Siberia have been made, and we have in our hands only occasional data. However, on the basis of a study of the elevation and climate, one can sufficiently define those regions where water power is concentrated.

Topography and Climate

The River Enissey divides Siberia into two parts: the level eastern part and the mountainous western part. The level character of eastern Siberia is well illustrated by the course of the River Ob, which near Barnaul, 1300 miles from its mouth, is only 250 feet above the level of the ocean. In the south, the Siberian plains become the Kirghiz Steppes and are separated from China by the Great Altai Mountains. Western Siberia consists of a level plateau crossed by several chains of mountains.

In the north, Siberia is open to the influence of the Arctic Ocean and therefore the climate is relatively colder as one travels from north to south and from east to west—from the Ural Mountains to the Pacific Ocean. The greatest humidity in Siberia, principally in its eastern part, is in summer. Upon examining a hydrometrical map of Siberia we can easily locate two centers with a maximum of humidity of 800-000 mm. These centers are Altay and the Maritime province.

Rivers of Siberia

The Ob, one of the greatest rivers of the world, has its source among the Altai Mountains. Many of its tributaries, for instance, the Kadun, Bia, Argut and others, have numerous waterfalls and rapids. The immense Enissey has a series of rapids and its tributary, the Angara (which flows from Lake Baikal) has ten rapids of considerable size, which alone would give hundreds of thousands of horsepower. The third large Siberian river, the Lena, and its tributaries, has a great number of falls and rapids. A great many rivers, ten of which would be considered principal ones by Europe, on account of their size, flow into the Arctic Ocean, many of them with numerous falls.

Industrial Development

It is clear that millions of horsepower of water power are to be found in this immense Siberian territory. However, we can speak only of the utilization of a part of this energy, as the severe climate and desert-like character of the northern and north-western parts of Siberia offer no possibility, at least at this time, of commercial undertakings. Better

conditions are to be found in the basins of Amur and the Baikal region, and there is no doubt of the possibility and profitableness in the very near future of the utilization of water power in the region of Altay, where there are concentrated quantities of water power, real mineral riches, and forests.

Furthermore, the southwestern part of Siberia is the most cultivated and the most densely populated; and here will be the location of industry in which water power can play a predominant part.

The nearest problem of great importance will be the development of the Siberian pulp and paper industries. Not only Siberia, but the whole of Russia as well, will be interested in this, as a great percentage of the paper for Russia's consumption was produced in Finland. In the production of paper and pulp, water power usually plays an exclusive part; in Canada, for example, 15.3% of the hydroelectric establishments are connected with this branch of industry.

The use of water power will considerably facilitate the standardizing of cement development for which Siberia is so greatly in demand.

Production of Metals

The production of cyanamid—of ammonia nitrate—without doubt will be one of the most desirable innovations in the Siberian gold industry, greatly helping in the increase of gold production, which is a well-known source of Siberian riches.

Passing over a great number of other products of electro-chemical industries, it is important to note the role of water power in the future electro-metal-lurgic industries of Siberia. Coal of different qualities is scattered over Siberia, but as far as I know, coal for coke of good quality is found only in the Kuznetsk Basin. Therefore, in the pig iron production in Siberia it would be necessary to economize in the use of coke or charcoal, and in this case the substitution of "white coals" for two-thirds of the computable coke would appear to be an indispensable condition for the iron industry.

The possibility of using water power in melting copper, zinc and other ores, in the production of different ferro-alloys and a high quality of steel, opens new perspectives for the utilization of the energy of rapids and falls.

Finally, hydroelectric stations can be used as central stations, distributing light and power to the cities and industries.

Generally speaking, Siberia represents an immense market, capable of requiring in future years hundreds of thousands of horsepower in water power.

圖路線道鐵電本日



A high speed electric railway from Tokyo to Osaka is one of the progressive plans now under way in Japan, and is significant of the development of the electrical industry in that country

The Electrical Industry in Japan

(The growth of the electrical industry in Japan has been little short of phenomenal during recent years. The following interesting data concerning the various lines of development is extracted from an article by Uтаро Noda, Minister of Communications of Japan, in a recent issue of "The Trans-Pacific" magazine.—The Editor.)

In the ten years between 1907 and 1917 the number of electric enterprises in Japan has increased by 347 per cent, while the increase in generating capacity is no less than 661 per cent.

Today, out of about 10,000 cities, towns and villages in Japan, some 70 per cent are supplied with electricity. The per capita consumption of electricity is estimated at 47 kilowatts a year. The capital invested in the electrical industry is about three times as much as is invested in mining, which has the oldest history of any of Japan's enterprises.

This development of the electrical industry of Japan has been due chiefly to the opening up of great water-power resources. This has meant reduction in the cost of electrical production and the use of electricity as the motive power for manufacturing purposes. Various important manufacturing undertakings now use electric power entirely. Impetus has also been given to such enterprises as the electrochemical industry, which is possible only where electricity is cheap.

At the same time the electrical industry has come into close relation with the life of the whole people. It is characteristic of electricity that it increases the industrial efficiency of the people; it increases the revenue of the employees and manufacturers alike by enabling firms of small capital to employ machinery. There are also examples without number of household work being greatly facilitated by the use of electricity.

Hydroelectric Development

The first hydroelectric enterprise in Japan was begun in May, 1891, when the water of the drainage system from Lake Biwa to Kyoto was utilized in a municipal project.

Special attention is due to the hydroelectric industry. In regard to generating capacity, steam-power electricity has increased by 377 per cent during the last ten years, and water-power electricity by as much as 1,223 per cent. Ten years ago water-

power electricity was not more than half as great as steam-power electricity, but the relative position has since been reversed, hydro-electricity production being about 50 per cent greater than that of electricity generated by steam-power.

The following tables will indicate the growth which has taken place:

NUMBER OF ENTERPRISES

	1907	1917	% Increase
Light and Power Supply and Tramway.....	177	668	277
Enterprises for Private Purposes.....	517	2,435	370
Total.....	694	3,103	347

GENERATING CAPACITY IN KILOWATTS

	Completed		Uncompleted		Total		% Incr.,
	1907	1917	1907	1917	1907	1917	Completed
Water-power	38,622	511,090	142,264	456,972	180,886	968,062	1,223
Steam-power	76,288	364,473	39,862	229,953	116,150	594,426	377
Total,	114,910	875,563	182,126	686,925	297,036	1,563,388	661

In view of this development of the hydroelectric industry, the government is aware of the great necessity of making special investigations regarding water-power available for industrial purposes, and it has already started investigations throughout the country with regard to horizontal water-power which can be used for over 185 days in a year during the five years from 1918. From results so far obtained, it is estimated that the power available in the future will amount to 5,200,000 horsepower (theoretical power, as will also be the case in other references hereunder). Taking into account the power which is already being used or for the use of which permission has already been given, amounting to about 3,300,000 horsepower, it is estimated that the total water-power in this country will reach over 8,500,000 horsepower.

Increase in Electric Lighting

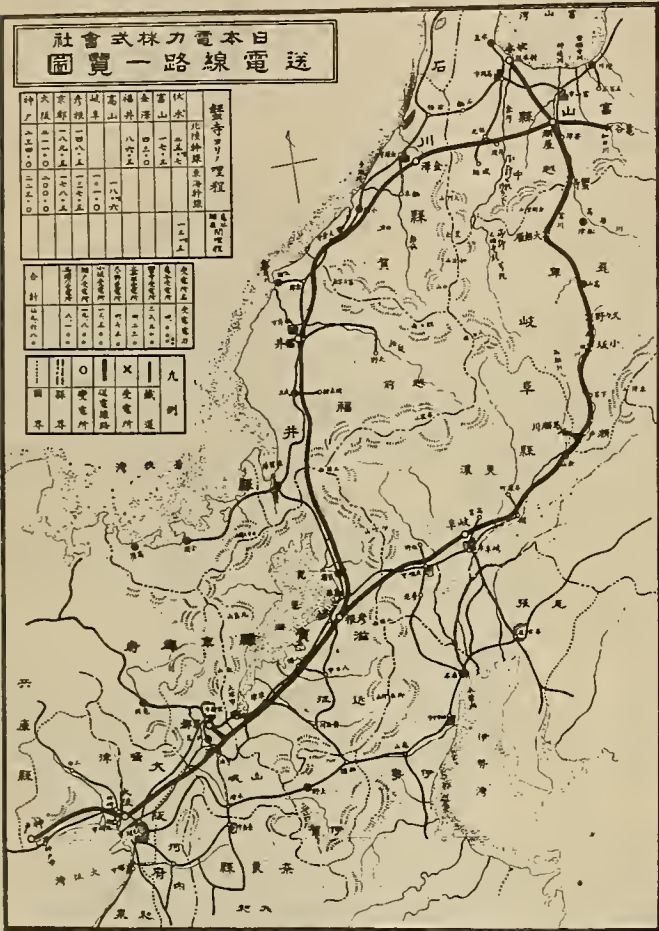
Great development and expansion have been witnessed in regard to electric lighting. As compared with ten years ago the increase is 1,000 per cent, while the increase over five years ago is over 200 per cent. At the end of 1917 the total number of

electric lamps in the country was 10,320,000 of 123,-000,000 total candle-power. These figures give 99 lamps per 100 houses, and 18.4 lamps with 218 candle-power per 100 of the whole population.

Of the 10,320,000 lamps, 3,380,000 or 38 per cent were distributed among the following six largest cities:

Tokyo	1,631,212
Osaka	763,552
Kyoto	303,019
Kobe	277,571
Yokohama	223,591
Nagoya	182,781

The number of electric lamps in use in towns and cities, excepting country districts, was 56.6 per 100 of the population, the candle-power being 738.



The interconnection of a great number of small hydroelectric power plants operating north of Osaka, the industrial center of Japan, brings a large number of small communities into closer touch industrially and at the same time ensures continuity of power service. The increase in industrial demand for electricity in Japan has been very great of recent years.

Industrial Demand

As already mentioned, the increase in the demand for electricity for industrial purposes has been greater than that for lighting. At the end of 1917 the number of dynamos supplied by electric companies was 67,000 with 314,000 horsepower. These figures, compared with ten years ago, show an increase of 1,600 per cent in number and of 1,700 per cent in horsepower. In addition, 19,000 dynamos with 480,000 horsepower were installed at government works and factories for their own use, bringing the total of dynamos up to 86,000, with 794,000 horsepower.

The uses of electric power, as in 1917, may be roughly classified as follows:

Enterprises	No. of Dynamos	Hp.	Increase in Hp. compared with end of 1914
Dyeing	14,025	119,036	58,779
Machinery making	18,098	210,485	116,880
Chemical industry	7,424	134,957	73,554
Food and beverages	29,202	69,635	32,072
Mining and refining	4,870	184,041	83,618
Others	12,381	76,369	37,644
Total	86,000	794,523	402,564

Tramway Service

With the development of means of communication the electric tramway service has been greatly extended of late. When compared with ten years ago, the mileage of tramways shows an increase of 390 per cent in actual length, while the increase in the number of cars is 210 per cent, as follows:

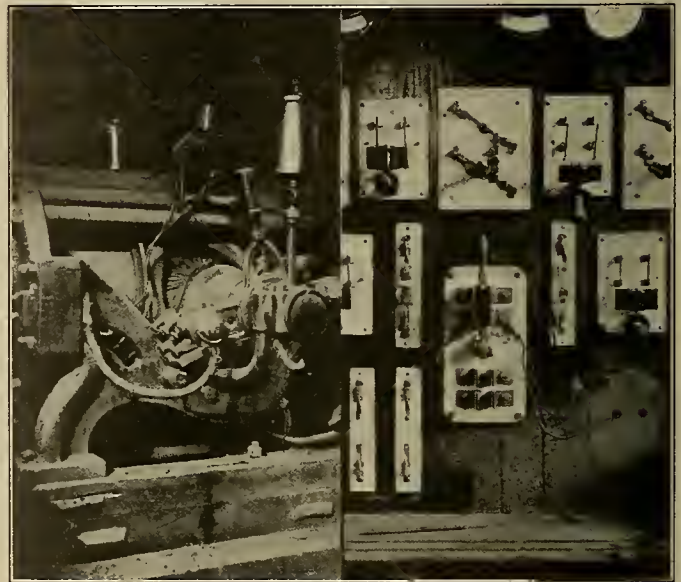
	Actual Length, Miles	Number of Cars
1907	292	1,456
1917	1,422	4,539

The increasing prosperity of the electrical industry has steadily increased the amount of capital invested. At the end of 1917 the total capital in enterprises for the supply of electric light and power and in electric tramway businesses showed an increase of 230 per cent over ten years ago. This capital represented that of concerns which were in operation and also of those which had not yet started operation.

AN OLD TYPE GENERATOR

(A remarkable and interesting electrical installation recently brought to our notice is that described below. The Latin Americas early adopted the electrical method and are now an open field for modern improvements.—The Editor.)

The dynamo shown in the accompanying illustration is an old type Thompson-Houston spherical d.c. generator, made some time in the early eighties.



An old generator and switchboard installation

The switchboard illustrated was made up in about the same period as the generator. They were used for furnishing light in the original plant in Retalhau, Central America, about twenty or twenty-five years ago. At the time the photograph was taken the generator was, with the exception of the commutator, in excellent condition. If the commutator were turned down, it would undoubtedly answer for another twenty years. The plant has a capacity of 75-kw. and is still in operation.

The Value of Courtesy

BY S. M. KENNEDY

(Courtesy is an inexpensive investment which yields disproportionately large returns in money value as well as in daily harmony and personal satisfaction. The various types of courtesy which enter into the routine of a public utility, and their effect upon true success are here discussed by the general agent of the Southern California Edison Company in the second of a series of articles on the human element in public utility practice.—The Editor.)

Most men are of the opinion that the average Chinaman, as he is known in America, may be considered unobserving, unimpressionable and more or less of a stoic. To such men the following incident may be surprising. Not long ago, a Chinese vegetable dealer entered one of the offices of an electric company in California to pay a bill. After finishing his business, he went out to his wagon which was standing in front of the office, and filling a basket with choice fruit, brought it in and presented it to

The essence of operation in connection with the machine is good management, and good management simply means running the business with all parts in harmony. In order to obtain harmony, there must be lubrication, and as oil lubricates the engine and keeps down friction, so does courtesy in business intercourse smooth out the rough places, disarm unreasonable criticism and invite good will.

Under a Microscope

It is probable there never was a time when public utility companies were as closely scrutinized as they are today. Undoubtedly there are reasons for present conditions in this regard. In the first place, the public has gradually learned that the commodities handled by such corporations, which once were considered luxuries for the few, have now become necessities for the many. In the second place,

*We acknowledge with thanks the
favor of your remittance which has
been credited to your account.*

Southern California Edison Company

An acknowledgment of receipt which goes a little beyond the mere perfunctory stamping of "Paid" on a bill is a courtesy much appreciated by the customer.

the young lady at the counter who had waited on him. The local manager, noting the incident, stepped up to the Chinaman and told him he considered that he had done a very nice thing and expressed his appreciation by personally thanking him. The Chinaman looked at the manager for a moment and then said, "She smiled and thanked me when I paid my bill." Without another word he went out of the office, climbed into his wagon, and drove away. If such a little attention is noticed by an uneducated Mongolian, it is fair to assume that the average American will appreciate any similar consideration which tends to demonstrate that his existence is recognized.

Intangible Assets

There are today approximately six thousand central station and municipal electric plants in the United States, representing a total investment of over two and one-half billion dollars. Each one of these plants possesses certain intangible assets, which now and then are inventoried for sentimental or business reasons. Among the intangible assets which it is difficult for the uninitiated to appraise is a reputation for courtesy. Yet, if a central station holds such a reputation, it necessarily possesses a valuable, though maybe an intangible asset, for, beyond peradventure, it is the best possible adjunct the central station has as a revenue producer.

The electric distributing business, as conducted by the modern central station, is a vast machine.

BLANK POWER AND ELECTRIC COMPANY

San Miguel, California
October 1, 1919.

Mr. John S. Wilson
510 Alvarado Street
City

Dear Sir:

I am pleased to learn that you have become a consumer of the Blank Power and Electric Company, at the above address, and take this opportunity of thanking you for your patronage. It is my aim to make you feel "at home" with our service, so that all the details of our business relations may be entirely satisfactory to you.

If at any time you do not receive the courteous and prompt attention to which you are entitled, I will deem it a favor if you will communicate with me over the telephone or by mail, and thus make it possible for me to give your wishes my personal attention.

Yours very truly,

Geo. M. Brown
District Agent

A:2

Why not let the new customer know that you are personally aware of his existence, and stand ready to serve him at all times?

through newspapers, magazines and other literature, the every day man has learned something more or less correct about the manufacture and distribution of electricity, and he considers himself qualified, as a student and a consumer, to have something to say on the subject whenever the opportunity occurs. In the third place, it must always be remembered that in the sale of an intangible commodity there is more or less mystery, and this feature is often the cause of criticism and controversy. Further, during recent years, almost every state has appointed a public utility commission, and through the commis-

sion's labors the troubles of consumers and the difficulties of the companies are alike laid bare to the public eye. No matter what may be said, truthfully or otherwise, about the methods of public utilities in the past, it may be safely asserted today that most utilities are anxious to put their houses in order, so that they may be able to withstand the closest scrutiny of friend or foe.

The Cornerstone of Success

The two greatest factors in the success of any central station business undoubtedly are courtesy and enthusiasm. These attributes must not be possessed solely by the president or manager, but must prevail throughout all departments, and in all ranks.

THANK YOU

YOU have been kind enough to favor us with your patronage to-day. We hope that you are pleased with your purchase, but if you are not, bring the goods back and we will exchange them or refund your money. It is our desire to satisfy each individual taste and with that end in

This form, printed on small bags or wrapping paper used for enclosing purchases of lamps or appliances, is a friendly reminder to the purchaser of the company's attitude towards its customers.

It is true that a utility company's business may be the only one of its kind in the community, and that the public must go to it if service be desired. It is well to remember that that condition does not make the public less critical. If consumers are treated with consideration, it is particularly pleasing to them, but if with discourtesy, it rankles through and through, because of the fact that they have no alternative, but must continue to do business with the same company. It is well to remember that many men have short memories for favors and all men have long memories for injuries, whether real or fancied. Many of those interested have reason to regret that there does not always exist a proper sympathy between a utility company and its consumers. The consumers are sometimes liable to think they are being overcharged and otherwise imposed upon, and the employees of a company are too ready to think consumers and the public "kick" too easily and too frequently. But it might be well if the employee would sometimes put himself in the customer's place, and realize that it is not an unreasonable thing for a man to ask questions and seek explanation about what he does not comprehend, particularly when he is paying out his money. No utility company can afford to be independent of the public. It is the public whom it must please, and look to for its continued existence—the same public that does not forget to remember some things which please and some things which displease. No matter how big or powerful a corporation may be, it is vulnerable—its very greatness sometimes making it a bigger and

better target; and as far as independence is concerned, the man who runs a peanut stand on a pushcart, and has only a five-dollar capital invested in his business, is a thousand times more independent than the corporation with its millions. If business leaves his corner, the peanut man can push his cart along to another location, but the public utility company puts its money in the ground, and cannot take it out, no matter what conditions may arise.

It seems reasonable to study the subject of courtesy from two standpoints. The first is the kind which may well be considered between the employees of a central station and the public, and which might be termed **conventional courtesy**. The second is the kind of courtesy that reaches out, beyond the actual point of personal contact, and follows people to their homes. This, perhaps, may best be described as **aggressive courtesy**.

The Daily Round

Now, it so happens there are few businesses which give so many opportunities for the display of conventional courtesy as that connected with the service of a central station company. The public is made up of human beings, and they all appreciate and enjoy considerate treatment. There is absolutely no excuse for inconsiderate employees handing out to the company's patrons hauteur, indifference, brusqueness or any form of discourtesy. Every man connected with a central station can do something each day to help along his company's business. By careless inattention he may likewise do something that will daily produce great injury to its interests. The public does not measure or judge a company by the acts of its president, officers or directors. They may be excellent men of high standing in the community, but they are usually known to only a few of the company's customers. The men who act as clerks, salesmen, collectors, meter-readers and troublemen, are the men who see the customers in



The personal 'thank-you' is at all times the best, but in default of this a sign such as is used by the Pig'n Whistle candy store in Seattle is a courteous acknowledgment which is better than none.

the office or meet them in their homes, who actually represent the company in its intercourse with the public, and it is through the words and actions of these men that the public commends or condemns their company. A central station business is not confined to any one class of people—all classes must be dealt with. It goes without saying that in the matter of treatment there should be no distinctions or discriminations between the big and the little, the high and the low, and the rich and the poor. All are equally entitled to courteous attention, and all should receive it.

Handling Complaints

The importance of the complaint department of a utility company cannot be too highly estimated. Upon the manner in which this end of the business is handled, largely depends the friendship of the company's customers, and the growth and prosperity of the company itself. The proper treatment of com-

utterly unreasonable, and sometimes even insulting, when making their complaints, and occasionally an employe who may be receiving a complaint will have to use restraint to keep from getting into a fighting mood. However, although a man may hold an awful tempest within himself, it won't break loose if he keeps his tongue tied down—and under circumstances of this kind, a tied tongue is safer than a loose one.

If a customer has a complaint rankling in his breast, it is well to get it out. Each complaint is an opportunity to make a new friend, and friends made this way are the sort who will gladly prove themselves friendly when the occasion offers. Little or much may be done by an employe to satisfy a complainant, but the main thing is to make him feel that his complaint was listened to with attentive consideration, that an interest was taken in his trouble, and a determination was shown to make matters right. What may have been given the complainant in the way of an allowance, or what may have been promised to improve his service conditions are only of secondary importance to the complaining consumer. It is not too much to say that a complaint may, at times, even be welcomed, because of the opportunity it gives to strengthen the list of satisfied consumers. It is not going too far to state that no adverse criticism of a company should be permitted to go unchallenged. The man who adversely criticizes should be interviewed in a courteous manner, and with a real desire to please. The critic will not be any worse for the tactful interview, and the chances are he will feel better toward the company and its business.

FORM C-214 I. M. 8-19

IN SUBMITTING THE ENCLOSED BILL THE FINAL ONE FOR YOU AT THAT ADDRESS, THE SOUTHERN CALIFORNIA EDISON COMPANY TAKES THIS OPPORTUNITY OF STATING THAT IT HAS ENJOYED THE PLEASANT RELATIONS WHICH HAVE EXISTED IN THE PAST AND HOPES THAT THEY MAY SHORTLY BE RESUMED, IF NOT IMMEDIATELY AT SOME OTHER LOCATION, PERHAPS AT A LATER DATE WHEN YOU MAY AGAIN BE IN NEED OF ITS SERVICE.

Courtesy which follows the customer even beyond the formal termination of business relationships will bring returns in good-will which are invaluable to the company.

plaints from existing consumers is more important than the method of managing the new business department. Satisfied consumers almost invariably become active agents for the advancement of the company's business. On the other hand, it is not difficult to estimate how much the growth of a business may be retarded by dissatisfied customers who are invariably sore through lack of proper attention and a little timely courtesy. The more people a company can persuade to think favorably of its business—the faster it will grow. As a man thinks, so he will talk, and a company with pleased consumers will have many working overtime for it, whose names do not appear on the payroll.

One of the best plans a central station manager can adopt as a means of educating employes along proper lines, is to regularly hold demonstration classes, the object being to show what should be said and done under certain conditions which may be more or less difficult to handle. Once each month would not be too often to get certain employes together. Some could represent complaining customers who come to tell their grievances, and other employes should receive the imaginary complaints and dispose of them in a proper manner.

There should be plenty of criticism and discussion and if earnestly handled, much benefit will accrue from such meetings. Employes need to be shown the importance of patience and self-control. It cannot be denied that a few customers may be

Aggressive Courtesy

The form of courtesy which may be termed aggressive is often evidenced along educational and publicity lines. This policy is one which points the way for consumers to remove the causes for trouble by displaying proper care in the use of their service, and frequently invites consumers to bring in their complaints, sometimes even before the consumers themselves have realized that they might have occasion to complain. Every possible means should be used to convince consumers that they are getting all they are paying for; that there is in reality no mystery about the electrical business and that electric current may be accurately measured and correctly billed. Courteous efforts along these lines help to establish confidence, and if confidence is maintained, it means more electric energy will be freely and willingly consumed. Individuals are fast learning the value of politeness. It is estimated that the people of the United States pay over eight million dollars annually to use the word "please" in their telegrams. That is—this large amount of money is paid for the word "please" when added to the stated ten words—or whatever the number may be. It is creditable to the people of America that the word "please" is so highly valued and the cost of inserting it in telegrams is paid without murmur.

Along the lines of aggressive courtesy, a Central Station company has many opportunities to impress its customers and the public with its sincere desire

to supply good service. This good service does not alone mean that an ample supply of electric energy shall always be available, but that all the niceties in the intercourse between the company and its customers will be cheerfully observed. It would be well for the Central Station manager to see that these opportunities are not overlooked. When a new customer is taken on, it is an opportunity to send a courteous letter which will surely interest and please the recipient. While giving assurances of personal interest and good service, the letter might readily point the way for the consumer to find additional uses for the commodity supplied. When the consumer sends a check in payment of his account, there is an opportunity to send a nicely worded card of appreciation with the receipt. When a consumer makes a purchase of lamps or any small appliances, the bag or paper in which the purchases are carried away might well have printed upon it a word of thanks for patronage given, and a desire expressed for its continuance. And even when a customer may be moving away and discontinuing service, there might be sent with the closing bill a card expressing the company's appreciation of past pleasant relations and a hope that they may be renewed at some future time. "Thank you" is pleasant to hear, and not objectionable when seen. If these words are stamped upon a receipted bill or stuck up in a conspicuous

place over a cashier's desk, they have some value, particularly if the cashier happens to think he is too big or too busy to utter these magic words himself.

A Good Investment

To the man who is habitually courteous, there comes an inward satisfaction, which is a continuous fountain of pleasure. There is more truth than poetry in the words credited to Admiral Sir Joseph Porter, K. C. B. in the opera H. M. S. "Pinafore:"

"For I hold upon the seas
The expression, 'if you please'
A particularly gentlemanly tone implants."

Be he on land or sea, the courteous man cannot fail to attract friends and disarm enemies.

Courtesy does not mean palaver, bowing and scraping—but common, ordinary every-day politeness—the kind that can give back a smile for a frown and always show a desire to please. This sort of courtesy is a fine art, and when consistently practiced, will spread sunshine in places that would otherwise be gloomy. Beyond any shadow of doubt, courtesy is of incomparable value in the operation and upbuilding of a Central Station business. It costs so little and means so much. It is the easy way to get along, represents no expenditure, yet never fails to yield handsome returns.

Sending Motion Pictures After the South American Trade

BY HARRY LEVEY

(The important part which familiarity and a degree of personal association play in the trade activities of South America give moving pictures a particular value as an advertising medium in that country. The possibilities along this line and the methods now being used by the United States and other countries are here set forth by the manager of the Industrial Department of the Universal Film Manufacturing Company.—The Editor.)

Owing to a peculiarity of the Latin temperament, the element of friendship enters into the business dealings of a South American merchant to an extent that would make a North American dealer think of the bankruptcy court. The South American, as the past has shown, will persist in buying from the man he is acquainted with. For decades the Germans were supreme in the continent below us, because they were the first to establish ties of friendship with the South Americans. It is high time the business men of America were making friends with their cousins south of the equator.

Next to doing it personally, what better way is there to get acquainted than through the medium of motion pictures?

The Film as a Letter of Introduction

A manufacturer can have motion pictures made of himself hard at work in the executive office. He can have films made of every process in his plant, from the arrival of raw material at the factory door to the final packing and addressing to "Somewhere in South America." In South America, because the Latin temperament is what it is, this personal value will be raised to the nth degree.

Let's suppose that the owner of the largest store in Rio de Janeiro has been taken by his wife to the picture show. One of the films is an American indus-

trial picture. Perhaps it is a one-reeler restricted largely to visualizing how the American product is made. Maybe it is a five or six-reel feature with an absorbing story enacted in and about the American manufacturing plant.

Some time later, next day perhaps, a representative of this American concern calls on the Rio dealer. Why, the South American knows all about the American plant. He has been through the very place where they make the goods the salesman wants to sell. He has been in the private office of the American concern's president; he walked through the factory and saw how it all was done. He knows that thousands of other Brazilians made the trip through the same plant. His shrewd reasoning tells him that his customers are likely to buy goods bearing the trade mark they saw in the motion picture, because those customers used their eyes as he did, and saw what skill the workmen put into the products of that plant. He has this in mind when the salesman opens his order book.

What Other Countries Are Doing

Japan and England are playing their motion picture card strong in South America, and they are getting the business.

Long since the English became aroused to the power of motion picture advertising. Even during

the war, when England was exerting the last ounce of her strength against the Germans, she found time to make 1,500,000 feet of industrial film, to have ready for use when world trade opened again. During the war's darkest hour she was getting ready to defend her commercial stronghold in the "war after the war."

English merchants realize that when a possible customer starts reading a motion picture advertisement his mind is in a receptive condition. He is sitting at ease in a comfortable theatre chair. In the silence of the theatre there is nothing to distract his mind. For sixteen minutes, if it is a one-reel film, the industrial picture advertisement has the undivided attention of the audience. Screen advertising has the advantage of pictorial appeal, and it entertains while driving home the point. Language at its best only creates mental images; screen advertising is all images. In a flash of reality it will make clear to South Americans what a steamer load of literature might not.

The Bureau of Commercial Economics

The Bureau of Commercial Economics is now sending eight specially built traveling motion picture auto trucks through the length and breadth of the United States to exhibit educational films. The bureau makes no profit on its films and is supported by endowment and subscription. The United States government and principal foreign governments are cooperating with the bureau. It has the largest educational films library in the world. It exhibits many pictures itself, but its principal purpose is to loan films free to schools, employers, churches, organizations, etc., just as a Carnegie Library loans books.

The bureau is now sending more than 300,000 feet of industrial film a month to South America; of this 250,000 feet is foreign film, every foot of which is aiding the merchants of Japan and England to get that South American trade. The American industrial films the bureau is accepting for South American distribution amount to only 65,000 feet a month. The score is 250,000 to 65,000 because American industries have no more films to offer—that's all they are having made.

The Film and the Salesman

Industrial motion pictures circulated haphazard over a nation, as the bureau would circulate them, would be of immeasurable value to an American business concern as a means of getting acquainted in South America, popularizing a trade mark or institutional advertising. But if the pictures were to be used as part of a selling campaign, whereby the film and the salesman would arrive in a city simultaneously, the pictures would have to be booked through the exchange of a regular picture concern.

This is being done in the United States. For example, the Universal Film Manufacturing Company's Industrial Department made a five-reel feature picture for a correspondence school. The correspondence school's advertising was incidental to the story. The most effective industrial films are those in which love, romance or adventure are so woven about the advertising that the average theatre patron, while impressed with the merits of the product exploited, enjoys, too, the real entertainment

value. The correspondence school gave the Universal distributing exchanges the dates it wanted the film shown in certain towns and the theatres it preferred. The salesmen arranged their dates accordingly. The results were such that screen advertising has become a permanent part of the school's advertising program.

The Manufacturer's Opportunity

The theatres of South America are prosperous and popular, and offer a fertile field for the exploitation of American industry. Frank C. Vanderlip has said that American manufacturers will win a world-wide market through the medium of film advertising—when they all get together and make a comprehensive start. President Wilson alluded to the motion picture as the "universal language," understood in all lands, by illiterate and educated alike. When are American business men generally going to begin speaking in this universal tongue to tell their story to South America?

THE DAIRY INDUSTRY IN SIBERIA

The dairy industry of Siberia is of such a progressive type as to present a possible market for electrical dairy devices. According to recent information from the San Francisco Chamber of Commerce, the Union of Siberian Creamery Associations is one of the largest, if not the largest of the cooperative groups. It buys and sells dairy products and equipment for more than 3,000,000 people. In the year 1917, after three years of war, the Union had a net earning of 1,500,000 roubles.

The movement has grown steadily since 1908, when the first step was taken to organize carefully. At that time 12 creameries and one distributing station were owned by the Union. Today there are more than 4,000 associations and 500,000 members. District offices are maintained in 33 central places in the dairy producing part of Russia and Siberia.

In considering the net profit to the Union, for a year, it must be remembered that the real benefit to the member is not in the money that is turned over to him in cash, but the low price at which he is able to buy machinery and other materials needed to improve his producing unit. The net profit referred to is but a sinking fund, set aside to insure other operations and guard against possible loss in the future. Among the various materials handled by the Union are cheese, butter and other dairy products. The Union maintains repair shops for the reconstruction of the various dairy and agricultural equipment owned by its members.

During 1918, 60 per cent of the total butter production of Siberia was handled by the Union, and in 1916, while Russia was actively in the World War, 98 per cent of the dairy products sold to the government were sold by the Union. In addition to the work of buying equipment and selling the product, the Union maintains a staff of expert instructors in the most up-to-date methods of dairy work, publishes two magazines and several newspapers. As a result of this educational work, the Siberian dairyman is rapidly becoming a big factor in the world's dairy product.

Future Trade Relations in the Pan-Pacific

BY JOS. McELROY, 3rd

(The growth of international trade is not a one-sided affair engineered by the seller in search of foreign markets, but a mutual benefit dependent on mutual activity. This article, urging the "foreign market" itself to make a point of getting in touch with the best source of supply as a matter of self-interest, is written by the export sales manager of Pass & Seymour, Inc., New York.—The Editor.)

In many of the countries bordering on the Pacific Ocean the use of electricity is in its infancy and will probably increase tremendously during the next twenty years. Unlike other lines of foreign trade, such as hardware, the sale of electrical articles of all kinds should constantly increase in volume on account of the increased use of electrical current.

Standard Goods

In most countries which are just introducing electricity it is very desirable that they start properly by introducing American standards, and thus put themselves in a position to secure constantly new supplies of all the different articles without delay. Furthermore, the American standard of electrical devices is of the highest type and finish, and practically all the articles formerly made in Europe, principally in Germany, can now be obtained from the different manufacturers in the United States. In many instances slight improvements in the interior mechanism have improved the foreign type of article which is manufactured by the American manufacturer.

There exists in this country at the present time a greater desire for foreign business than has ever existed here before. Nearly all firms of importance are giving the subject consideration, with the result that any foreign merchant purchasing electrical articles from a United States manufacturer of good standing, can be assured of receiving his goods properly packed according to his market conditions or in accordance with his instructions. He will usually find also that the American manufacturer will grant him the credit terms to which he has been accustomed.

Unwise Delays —

There has been a tendency on the part of many foreign buyers to delay in the purchase of their requirements in the belief that prices would decline upon the termination of the world war. This is a mistake. There is no prospect of a general reduction in the price of electrical articles because the price of raw material has not declined to any large extent, while the cost of labor continues very high and in some instances is actually increasing. In addition to this is the fact that during the last four years building all over the United States was suspended, with the result that there exists at present a great shortage of dwelling houses of all kinds, as well as office buildings. Building is now being resumed in all the principal cities with a consequent demand for an enormous quantity of material. Very few factories have been able to accumulate any stock, and now that the demand from the domestic market is beginning to set in, due to the increased building, it is predicted that before the end of the year 1919 there will exist

an acute shortage of many electrical articles. In view of this condition, therefore, it is the part of wisdom for the foreign buyer to place his order for his current requirements as promptly as possible in order that the American manufacturer may give him service and prompt delivery.

Transportation Service —

The fact that the United States government plans to maintain a large mercantile marine in the future will give foreign purchasers a frequent and regular steamship service at a reasonable freight rate, and as the United States is a large purchaser of the products of countries bordering the Pacific there should be no difficulty in obtaining a full return cargo for these steamers. There is no country today in a position to supply electrical articles of all types to the foreign buyer excepting the United States, and this condition will probably exist for several years.

Developing Trade Relations —

One result of the great world war has been that the people of various countries have been drawn closer together and have become better acquainted. We have a very friendly feeling toward our fellow Americans living in South America, and it is our endeavor to assist the Chinese as much as we can in the development of their huge country. It is naturally to be expected that the Hawaiian Islands and the Philippine Islands would be customers of the United States inasmuch as they are United States territory. It would pay the plantation owners in these territories to examine the catalogs of the American manufacturers; they will be surprised at the many articles that are made which will aid them in their daily business and also be indirectly a source of profit to them. One item in this connection is well worthy of mention, and that is the farm lighting outfit which is now manufactured by a number of different firms. This has proved a great comfort and benefit to many isolated farms and plantations in different sections of the world, and the sale of these outfits is increasing very rapidly. The plantation and farm owner cannot only light his house and grounds but can also put the machine to other uses, such as churning, sawing wood, etc.

It is a matter of common knowledge that Japan has entered into the manufacture of electrical articles very largely during the last ten years, but in spite of this fact she finds it convenient to purchase large quantities of electrical articles from the United States, as the statistics show: for instance, during the month of March there was exported from the United States to Japan \$3,972 worth of electric batteries, \$174,369 of dynamos or generators, \$2,813 of electric fans, \$3,079 of heating and cooking appara-

tus, \$3,151 of insulated wire and \$29,679 of incandescent metal filament lamps, \$40,406 of magnetos and spark plugs, \$50,493 of meters and measuring instruments, \$145,512 of motors, \$30,321 of switches and accessories, \$21,805 of telegraph apparatus, including wireless, and \$103,271 of transformers. This is only a partial list of the electrical apparatus imported into Japan during this one month.

For many years Australia, New Zealand and Tasmania have been steady and consistent buyers of American made articles, and it is to be expected that the trade between these two countries will continue to increase in the future. A commissioner from the

Dutch East Indies has pointed out that while the statistics show a large increase of trade and many millions of articles purchased by his people from the United States during the past year, this trade can still further be increased owing to the needs of his country.

The prospective purchaser of electrical material residing in countries bordering on the Pacific Ocean should make a point of getting in touch with reputable manufacturers of these articles in the United States from whom he will secure fair treatment, credit terms to suit his convenience, and goods well packed and of a superior quality.

Trade Opportunities in Latin America

BY GEO. W. FISHBACK

(Latin America offers to the United States one of the most fertile of all fields for foreign trade expansion. The present trade conditions existing between the two countries, the need for increased activity, and the channels of approach are dealt with in the following article. The author, who is now in charge of courses in foreign trade being given at the College of Overseas Commerce, has had extended experience in the diplomatic service in South America.—The Editor.)

Opportunity for trade in Latin American markets is knocking insistently at the doors of our manufacturers, and incidentally at those of every young man and woman who will qualify now to work out as fine a career as was ever offered to any generation.

That career may be in commercial, scientific or professional fields, or it may be in the diplomatic

The commercial situation in which we find ourselves today is as follows:

Our total exports for the fiscal year ending June 30 of last year amounted in round figures to six billions of dollars, and our imports for the same period were about three billions. Twenty per cent of those exports were war supplies. During that same period, our exports to Latin America were seven hundred and forty millions, and our imports were a little over one billion dollars. This shows that we supplied about 40 per cent of the imports of Latin America, as compared with 15 per cent for some years preceding the war. Latin America consists of Mexico; six republics in Central America; three in the Caribbean, and ten in South America.

The Need for Effort

Now, the above amounts are enormous, and show that a big proportion of the world's trade is today within our hands—but we must bear in mind that this trade has come to us without any great



CALLE FLORIDA, BUENOS AIRES

This street is the main artery of the city of Buenos Aires, and the center of business activities. The rapid development in some of these South American cities offers a splendid field for United States enterprise if effort is expended in the right direction.

and consular service. To qualify for activities in any one of them means becoming familiar with those markets; with the people in them; with their languages; with their customs, and with their methods of daily intercourse, in the drawing room as well as the counting room. To establish an entente cordiale with the people you are going to deal with is the first prerequisite in the South American atmosphere, and in order to do that you must consider their viewpoints, as well as your own, and observe throughout the association the amenities of a friendly and cordial intercourse.



AVENIDA DE MAYO, BUENOS AIRES

Note the ornamental lighting system on this fine street. In the few large centers on the west coast electrical development has reached a very advanced stage; its main use outside the cities is confined to the mines.

effort on our part, and largely because the demand could not be supplied elsewhere. We have not done very much to facilitate it, and the extension of cred-

its to foreign buyers has been very limited—in fact, most of our exports have been paid for before shipment, or at the very latest, just after delivery. Now, it can easily be seen that this trade now existing can never be retained when European exporters are again in the field ready to deliver goods, cut prices and extend credits as they did before, unless we now thoroughly cultivate this vast field of opportunity. And the way in which to do it is to meet our customers half way; to study their needs, customs and notions; to sell to them at fair prices; to extend credits and increase good will and friendship and thus develop a structure that will be lasting, and a trade that will not easily be moved when our active competitors again get under way—and there are evidences already of renewed activity. We are going to feel the need of as large a foreign market for the output of our factories as it is possible to develop, and there never was a time in the history of the United States when a discriminating, steady foresight was more necessary than right now. In Latin America the natural resources are boundless, they are as yet comparatively untouched, the people are well disposed towards us, we have a big surplus of production, we have the ships in which to carry it, we have the banks through which to clear it, and we have at our disposal the distributing power of solid, financial importing houses in every big city south of the Rio Grande, with whom connections can be made by the mere wanting to, and the knowing how. The tools are all at our hand—it remains for us to use them with intelligence and skill.

Channels of Development

The spirit of foreign trade is abroad in the land, the movement extends from coast to coast, men and women are studying languages and countries and



THE PLAZA HOTEL, BUENOS AIRES

This hotel is one of the most famous in South America, and is significant of the spirit of progress which pervades the country and is reaching out for foreign trade. Building activities are only one phase of the rapid growth which is so closely bound up with electrical development; electric railways already in operation are phenomenally prosperous.

methods of foreign intercourse, in order to qualify for an overseas career, representing American interests, either commercial, scientific, or political.

The United States diplomatic and consular service, and the working relation between it and our foreign commerce, is a subject worthy of high consideration and study, purely as an instrument for the extension of our trade abroad. As Mr. McKinley



ARGENTINE NATIONAL CONGRESS

The diplomatic and consular service of the United States in South America is intimately connected with the trade relations of the two countries. To maintain the friendly feeling between the peoples, to study the international needs, and to promote the activity of the commerce—these afford an important opportunity which falls to United States representatives in South America.

referred to expositions as “Milestones of Progress”—so our consulates are known as the outposts of our commercial army. The relationship is most intimate, and our consular service has been since 1906, and is today, the best among those of the great powers. The question of establishing a special course of training for the service has been undertaken by the College of Overseas Commerce in San Francisco, with offices in the Flood Building.

Present Status of Trade Relations Between United States and South America

The total commerce between the United States and Latin America in the calendar year of

1915 was.....	\$ 921,000,000
1916 was.....	1,261,000,000
1918 was.....	1,990,000,000

United States imports from Latin America were:

1916.....	\$ 776,000,000
1918.....	1,250,000,000

United States exports to Latin America were:

1916.....	\$484,000,000
1918.....	740,000,000

This shows the possibilities of the trade.

We exported to South America—

In 1870.....	17 million—	41½ % of total
In 1900.....	38 “	— 23¼ % “ “
In 1910.....	92 “	— 51½ % “ “
In 1913.....	146 “	— 6 % “ “
In 1916.....	484 “	— 15 % “ “
In 1918.....	740 “	— 40 % “ “

The question now is: Are we going to hold this 40% of the total,—are we going to increase it, or are we going to allow it to fade away because of indifference and neglect of a wonderfully rich market?

Standardization With Metric Units

BY AUBREY DRURY

(Who knows but what the interruption of the great engineering feat of ancient history as recorded in the Bible—the building of the tower of Babel—was due to the confusion of tongues in matters of units employed in measurement? Not until our Allies had in a measure standardized much of engineering manufacture and design did we begin to make an imprint on the common enemy. The days of readjustment now upon us demand serious consideration of immediate adoption of metric units. Here is a timely and forceful discussion on this important subject by the Associate Editor of the Journal of Electricity who has given months of time and study to this important problem.—The Editor.)

SINCE the armistice there has been much effort at reconstruction. In practically every field of human endeavor plans are being evolved which aim to repair the ravages of War, to place humankind on a normal basis and above all to bring the world closer together. In bringing about a better understanding and greater power for co-operation among all humankind, we are learning at the beginning of what promises to be an enormous expansion of world trade a lesson which we had borne in upon us during the exacting trials of the war—the fact that one of the vital needs of the present-day world is a logical uniform standardization of weights and measures.

The Decimal System

There is only one real "system" of weights and measures now in use. It is that simple, decimal system which employs the 3 principal metric units: meter-liter-gram. This system has been adopted as the sole standard by 34 important nations and in 212 countries of the world the metric units are more used than any others. In fact, the United States of America and Britannia stand virtually alone as nations which have not recognized the infinite superiority of the metric system.

Although the first to apply positional decimal arithmetic to coinage, weights and measures was a Briton, James Watt, who offered it to the world in 1783, of all the nations the English speaking peoples alone cling to the inadequate system of yards, feet, inches, tons, pounds, ounces, quarts, pints and gills and so on without end, and the ironical side of the matter is that this clutter of illogical, unrelated, bewildering weights and measures originated in Germany.

It is a relic of the old German Hanseatic Trade League which foisted it on England, although Germany herself scrapped these antiquated standards in 1871 in the interests of national efficiency.

The Lesson of the World War

During the war we found, when we began our gigantic task of transportation, equipment and supply, that in the essential matter of weights and measures we were not at one with our allies. We found that 30 nations fighting Germany were all using the metric units of weights and measures, and were thus capable of complete coordination and united action. But the United States and Britannia discovered they were using an antiquated jumble of weights and measures which had been scrapped by all other enlightened people more than a generation before. And although the so-called "English" system of weights and measures was supposed to be

standardized, we found a confusing difference between the measures of the United States and those of Britannia.

America and Britannia had ample cause to regret, during the war, that they had not heeded James Watt in 1783, and Thomas Jefferson in 1786. Read in the report "America's Munitions" by Benedict Crowell, Assistant Secretary of War and Director of Munitions, just issued by the United States Government printing press, how America was hampered and delayed by the necessity of translating specifications into metric measurements. He speaks of the loss of weeks and "even months of time" on the part of whole staffs of experts working at high tension.

Need for Standardized Munitions

He tells of the redesigning of American and British guns to conform to the measurements of the famous 75 millimeter pieces of the French, and in order to utilize French, Italian and other allied ammunition. These examples are typical of the wastage, the delay, the confusion caused by our adherence to antiquated standards of weight and measurement, while the rest of the world had progressed to scientific uniform standardization.

The war was full of lessons in this regard. Two million Americans in France had actual experience with the metric weights and measures and found them easy to understand and simple to use. Both American and British armies found that it was absolutely necessary to become standardized with all allies, and both governments with the object of obtaining the utmost efficiency in warfare, ordered the adoption for military purposes of metric units, the British in 1914, and the American War Department through General Order No. 1, in January, 1918.

How much better off we should have been if instead of waiting for General Order No. 1 we had adopted metric standards exclusively when Benjamin Franklin and Thomas Jefferson urged the United States to do so in 1786, or even if we had taken them up when Germany did, in 1871.

Long Under Consideration

It is a fact that ever since the time of Thomas Jefferson and Benjamin Franklin this question of reducing our weights and measures to a rational standard, interchangeable with the standard used by the majority of civilized nations, has been more or less energetically discussed by the public and dallied with by Congress. Fortunately, at the instance of Thomas Jefferson, we adopted in the United States of America decimal money and thus we are at least one step ahead of the British Isles, which still cling to the

bewildering pounds, shillings, pence and farthings of an antique German coinage.

Yet America is in the main like Britannia. Both are in this case victims of inertia and slavery to blind tradition.

Now interest is aroused in meter-liter-gram, however, not alone because of the greater simplicity of the metric system and its superiority as a working tool, but more because of the fact that post-war traditions have laid new emphasis upon world-trade and opened new prospects of the part that the United States is to play in the commerce of the world.

Best for World Trade

Far-sighted men who have studied international trade conditions and who have the commercial interests of the United States at heart have come to the unqualified conclusion that we are attempting to enter upon world trade equipped with the wrong tools. Vast markets for American goods are seen in South America and the Orient, and only of late have merchants come to the disconcerting realization that as far as the language of quantity goes—and that is the all-important part of language in world trade—we do not speak in the same terms as the people of South America or the Orient. We find that while we insist upon dealing in our difficult and cumbersome weights and measures, the peoples of South America have for generations used exclusively the system of metric measurements and are disinclined to understand any other.

We find, too, that in the Orient, particularly in China, it has been decided that metric measurement shall ultimately be adopted exclusively. China is now in the process of turning her 426 million population over to the use of metric weights and measures. Japan, too, has a commission studying the subject; and the last Trans-Pacific Magazine predicts a decision for exclusive use of metric standards, already extensively employed in Japan.

Word from Eminent Authority

On November 10, 1918, the International High Commission of which W. G. McAdoo, then Secretary of the Treasury, was Chairman, announced that this subject was deemed of particular importance to the United States and that in the opinion of the United States Section of the Commission, "adoption of the metric system would be of great advantage to the commercial relations of the United States with the other American Republics."

This attitude is identical with that assumed by Secretary of Commerce William C. Redfield, who has advocated unqualifiedly the adoption of metric units by the United States in the interests of world commerce. He says:

"I have heard men say that America can sell and is selling quantities of goods abroad without the use of the metric system. Certainly that is true. She can do that to a certain extent, but compared to what America could do if she would adapt herself to the needs of the people abroad, it is like selling remnants.

"The day when any nation engaged in industrial production could impose its ideas and views on any other nation to which it desired to sell goods has gone by, if it ever existed, and the only way you can sell goods in these days is to sell to people exactly what they want. A company must sell its mechanical goods of all kinds in the markets of the world, made in the way the people want them, and no

amount of explanation on the part of the salesman will make the U. S. standard wrench go on a hardened nut finished on the metric system, and it is nonsense for anyone to suggest anything to the contrary. It won't fit, and you can not sell any more goods of that kind.

"For men to go to a French factory and attempt to sell for use in that factory an engine constructed on the feet and inches basis, would be so hopelessly ridiculous that only a man entirely lacking in judgment would ever do it."

Meter-Liter-Gram in Export Trade Again Redfield declares:

"From a practical standpoint, now that Germany is out of the export field for a considerable number of years, with the likelihood that as an economic force she may be reduced to a minor place, the nations of the world which Germany supplied with goods are looking to Great Britain and the United States for supplies. Shall they get them?

"If you had been a hardware dealer in Buenos Aires or Santiago, Chile, you would have bought tools and supplies in Hamburg or some other German city. You would have gone there for your stock, and in all probability you would have been buying there for 40 years or more. Material would have been sold to you conforming to your national standards of measure in Chile or Argentina or Brazil, and now where will you get it made to your standard of measurements? In Great Britain or the United States? Not unless the American manufacturers are wise enough to do what the Germans did so successfully before.

"If the Chilean merchant or the Brazilian merchant goes to the United States and seeks commodities in centimeters and millimeters, and finds them in inches and half inches, and if he comes in contact with that absurd measure called a half of a sixty-fourth, he will look to see where he can find men more flexible in mind and more intelligent in their practical applications."

The arguments applied to South America apply to the Orient and they apply to all those nations of Europe (and that means every one except Britannia) which now use metric units. As Nicholas Murray Butler, President of Columbia University, well says: "Adoption of the metric system by English-speaking peoples would advance world trade as it has already advanced science."

Organizations Favor the Advance

Commercial organizations and associations of manufacturers are now awake to these momentous facts. The American Chemical Society, with 13,000 members, has passed significant resolutions, reading: "It is unanimously voted that the American Chemical Society heartily favors the universal adoption of the metric system, so far as possible, to the exclusion of all others, and that the Committee on Foreign Chemical Trade be requested to use its influence to have the metric system adopted in America's foreign trade, in order that this country may compete in countries that have already adopted this simplest and most perfect system of weights and measures."

American Institute of Electrical Engineers voted for the adoption of meter-liter-gram for general use, by a large majority.

American National Wholesale Grocers' Association voted overwhelmingly in favor of adoption of metric units.

American National Canners' Association urges adoption of metric units. This sentiment was passed at a convention of 5,000 delegates.

Recently the Washington State Manufacturers' Association urged the adoption of the metric system by a 2 to 1 vote.

Among the many other important organizations which have been active in advocating exclusive use of meter-liter-gram are: Associated Steel Manufac-

turers of U. S. America; American Association for the Advancement of Science; American Drug Manufacturers' Association; American Institute of Chemical Engineers; American Pharmaceutical Association; American Institute of Makers of Explosives; National American Association of Retail Druggists; National American Association of Wholesale Druggists; National American Scale Men's Association. There are signed petitions to this effect now in Washington, D. C.

Support by Eminent Men

The World Trade Club of San Francisco has been conducting an aggressive campaign for the exclusive adoption of metric units, and has secured the endorsement of hundreds of eminent men throughout the world. Among the prominent individuals who support this movement for standardization are William G. McAdoo, Franklin D. Roosevelt, John Hays Hammond, Henry Ford, Luther Burbank, Thomas Edison, Hudson Maxim, Henry van Dyke, Major Fiorello La Guardia, A. E. Kennelly, David Starr Jordan, Thomas C. Mendenhall, George Frederic Kunz, James Speyer, Albert Bushnell Hart, Bliss Perry, Theo. N. Vail, Alexander Graham Bell, Otto H. Kahn, George W. Perkins, Dr. Charles H. Mayo,

R. T. Crane of the Crane Co.; Samuel Gompers, John Spargo, Major-General William C. Gorgas; John H. Gerrie, editor of Pan-Pacific Magazine; Judge E. H. Gary; George Otis Smith, Director of the Geological Survey; and hosts of others.

Andrew Carnegie said to the American National Association of Manufacturers: "Our present weights and measures are unworthy of an intelligent nation of today." Dr. Charles W. Eliot, President Emeritus of Harvard University, wired the World Trade Club: "The adoption of the metric system by the United States of America would greatly reduce labor in trades because of the thorough decimal quality of the system and would facilitate the teaching of mathematics and applied sciences in schools."

One of the most eloquent appeals ever made in behalf of the metric system was that by Charles Sumner in the Senate of the United States of America, 1866. He declared:

"A system of weights and measures born of philosophy rather than chance is what we seek. To this end old systems must be abandoned. A chance system cannot be universal. Science is universal; therefore, what is produced by science may find a home everywhere."

Engineering and Industrial Standardization

BY C. A. ADAMS

(Standardization is coming to play a large part in all modern progress. Its application in engineering and industrial fields is here discussed by the chairman of the American Engineering Standards Committee, an organization recently formed to remedy the present unsatisfactory conditions. The Committee's formation, scope and procedure were described at length in the August 15th issue of the Journal of Electricity. The following material formed part of a paper presented recently before the A. I. E. E.—The Editor.)

Most of us speak of standardization in a vague sort of way, usually having in mind some particular corner of the field, but without sensing the comprehensiveness of the word or the magnitude and importance of the field covered, not realizing that the cooperation without which our modern society would be impossible, would in turn be impossible without a large measure of standardization. It might almost be said that the degree of standardization in any nation is a measure of its civilization, certainly in the material or industrial sense of the word.

Comparative chaos still reigns in most parts of the field of engineering and industrial standardization, not only in the standards themselves but underlying this in the methods of creating them.

Technical Language

One of the first needs is for the standardization of definitions of scientific and technical words, terms, phrases, abbreviations, symbols and diagrams.

Standardization of these elements of our technical language is just as fundamental to intelligent intercourse in this field as in the case of ordinary word intercourse; in fact it is more fundamental since we are here dealing mostly with accurately measurable quantities.

Some progress has been made in this field even to the extent of international standardization of terminology, but chiefly in connection with very funda-

mental matters, there being still in the outlying fields a very wide diversity of usage in the matter of symbols, abbreviations and diagrams, and in a lesser degree in the use of words. There are at least fourteen different organizations in this country alone, each of which has its own system of diagrammatic representation covering electrical wiring and devices. Many other similar illustrations are available of the frightful inefficiency of the present haphazard, uncoordinated work in this field.

Standards of Quantity

In the consideration of length, area, volume, mass, weight, density, pressure, heat, light, illumination, electricity, magnetism, radioactivity, physical constants and their relation to each other, the same point arises.

Some of the fundamental standards of this group are of such importance in the every-day life and trade of a nation that they are prescribed by law and each city or county has the necessary machinery for enforcing the law.

Nearly all European nations as well as the Latin-American nations have adopted the rational metric system, whereas the English speaking nations still cling to the English system with its confusion of oddly related weights and measures.

However since the electrical and magnetic units are the same the world over, since they are based

upon the metric system, and since practically all scientific work is handled by that system, a vast amount of time is wasted by the English speaking nations not only by the necessity of becoming familiar with both systems, but also in their use due to the frequent necessity of transformations from one to the other. This latter loss is particularly serious in the field of electrical engineering.

Standards of Quality and Performance

Specifications for materials together with standard methods for testing their qualities are another consideration.

Certain standards of this type are also of such importance to the welfare of society that they are prescribed by law, notably in the food field, and a bill is now before Congress for the standardization of fertilizers.

Standard specifications and tests for the materials of engineering and construction are almost wholly prepared by the American Society for Testing Materials, which society was organized solely for this purpose. In no other field is the work of standardization better organized.

In the field of operating characteristics of machines and devices, output, rating, speed, efficiency, durability, etc., as specified in terms susceptible to measurement, together with the methods of making these measurements, the most notable example of comprehensive work is to be found in the Standardization Rules of the A. I. E. E. Another is the Power Test Code of the A. S. M. E.

Standards of Practice

Among regulations or codes dealing with construction, installation and operation, based upon considerations of safety, quality, economy, convenience, etc., the oldest code in the electrical field is the National Electric Code of the N. F. P. A., first issued in 1897 and since frequently revised. This has been largely copied in the local municipal regulations of most large cities.

The National Electrical Safety Code was issued about three years ago by the Bureau of Standards after long and careful collaboration with the most interested organizations. This covers safety to life rather than fire protection.

There is now under consideration the preparation of some fifty-odd industrial safety codes. This work will probably be carried out according to the procedure prescribed by the American Engineering Standards Committee, with the appropriate organizations acting as sponsors. The Bureau of Standards will doubtless serve as sponsor for some of these codes.

Types and Designs

In the standardization of types and designs, most of the work has been done, until comparatively recently, within individual corporations as a matter of production economy. A notable example of this is the Ford automobile.

But within the past few years much has been accomplished in the automobile industry as a whole by the Society of Automobile Engineers.

This also is true in certain parts of the railway field in the standard freight and passenger cars,

through the Master Car Builders' Association. The variety however is still enormous. There are at least 500 different types of locomotives, although the U. S. Railroad Administration has recently reduced the standard types of passenger locomotives to twelve.

One of the most striking examples of the possibilities in this field is the attempt only just started by one of our most progressive manufacturers of electrical machinery, to develop standard electric motor designs. Nine manufacturers are working together to this end. Consider the immense advantage to the consumer resulting from the general interchangeability of parts, and the reduction in the number of spare parts carried by a user who has motors of several of these cooperating manufacturers. Moreover the designs will contain the best features of all these makes, and there will still remain ample opportunity for competition in production cost and quality of workmanship.

Need for Standardization

An illustration from the electrical field of the need for standardization has to do with the rating of electrical machinery. In the early days there was no agreement as to what was meant, e. g., by a ten-horsepower motor. As a result fair competition was impossible. The ratings of the several manufacturers varied as much as 30 per cent and the customer was at the mercy of the persuasive talents of the salesman. It took the Standards Committee of the A. I. E. E. five years to revise its old system of rating of electrical machinery in such a way as to be rational, scientific, satisfactory to all concerned, and capable of reasonably accurate checking by commercial tests. The results of this work have proved to be of world-wide value. They have placed competition on a far more equitable and generally satisfactory basis; they have encouraged more careful and thorough designing; they have encouraged a more careful selection of size on the part of the user, and have generally resulted in better machines.

Machinery of Standardization

At present the work of standardization is carried on by numerous organizations each in its own field and with its own machinery, usually through a standards committee. But the fields overlap and the machinery differs largely in the different organizations. In many cases the committees are made up of men who do not realize that a standard must be not only rational and technically correct but also acceptable to all those interested in its production and use. The mere promulgation of a standard by any society, however powerful, does not make it a real standard.

Moreover the fields of the several organizations overlap in large degree; there is much duplication of effort and confusion of result, and many of the standards promulgated are practically useless.

Cooperation between two or more organizations has been tried, sometimes successfully, but there was no recognized machinery of cooperation, no standard procedure, and confusion still reigns. It is to meet this need that there has recently been created an American Engineering Standards Committee.

The Size of Ships and Pacific Harbors

BY C. E. GRUNSKY

(The tendency toward increasing the size of ships is one of the factors which limit commerce to the two or three principal ports of the world. The suggestion here made that ships be kept within a limit of size which will enable them to make use of the normal harbor is a matter of great importance to Pacific trade. The author, who is a prominent consulting engineer of San Francisco, was a member of the first Panama Canal Commission upon which devolved the necessity of determining the width of the canal—another factor affecting the size of ships suited for Pacific trade.—The Editor.)

The question of dimensions to be given to maritime canals is understood to relate specifically to the minimum dimensions of the canals and to the dimensions of the large sea-going vessels. The inter-relation of the size of the largest sea-going vessels and of the required dimensions of the canals is recognized in the question.

If it be admitted that the dimensions of the sea-going vessels are to be determined solely by the needs of trade and commerce, by economy of operation, and by the demands of passengers for speed, comfort, and luxuries, without regard to harbor facilities and without regard to the possible usefulness of the vessels to their governments in case of war, then it becomes comparatively easy to predict future growth.

But, and perhaps fortunately, there are other considerations to be taken into account, notably the general usefulness of large vessels, which, according to their size and particularly their draught, may be materially restricted by the dimensions of maritime canals and the depth of the approaches to the principal harbors of the world. The ever increasing size of vessels has compelled the enlargement from time to time of maritime canals and harbor approaches. Among these are such instances as the improved Weser, where the present requirements were not foreseen when the improvements were planned by Franzius in 1879 to 1881; the Kaiser Wilhelm Canal, built in 1887 to 1895 and later enlarged at a great cost; the Suez Canal which has been made wider and deeper and now has sufficient depth for vessels with 28 feet (8.53 meters) draught.

If the deepening of the harbors and of harbor approaches is continued without restriction the size of the largest ocean liners will, under otherwise permanent conditions, continue to increase.

Without any restrictions upon the size of vessels, they will be built constantly larger as demanded by economy of operation and by the needs of commerce, and only those ports can hope to be favored with the visits of the largest vessels which find it worth while to afford suitable harbor facilities.

The growth of vessels, therefore, exerts a strong influence upon the concentration of the export and import business at certain points, such as New York harbor where nature has made possible the construction of the facilities demanded by the ship owner who wants to operate the largest boats that can with safety and without delay be taken into and out of the best harbors on the two sides of the Atlantic.

It follows from this that it is to the interest of the port which is less favored by natural conditions that some artificial limit be set to the size of the ocean carriers, particularly in the matter of draught,

in order that harbor improvements may be planned with reasonable certainty that they will be adequate.

There should be an international agreement entered into that some depth of water at low tide is the standard to which the important harbors of the world should be improved and there should be no government aid in the form of subsidy or otherwise to vessels whose dimensions are such as to make the entrance into a harbor of standard depth impossible.

It would be unwise, for example, for the United States to construct or to encourage by subvention or otherwise the construction of vessels too large to pass through the locks of the Panama Canal.

By the construction of the Panama Canal, a stupendous undertaking, the United States has practically set an upper limit for the dimensions of vessels whose construction can be encouraged by the government. The canal and the lock system on the canal have cost too much to be readily modified. For the time being the usable lock length on this canal of 1,000 feet, the breadth of 110 feet and the depth of 41.5 feet on the sills of the lock gates, equal to 40 feet in salt water or to 12.2 meters, has fixed the maximum dimensions both of war vessels and other vessels that are likely to be constructed by the United States or by American owners under government aid.

But if standard maximum dimensions for the largest desirable sea-going vessels be thus set by the United States, or by an international agreement participated in by the important maritime nations, this will not set a limit to the further improvement of shipping. There is room for improvement even when the limit of size has been reached. The internal combustion engine for example is full of promise and may be of material aid in increasing cargo capacity. The gain in cargo capacity resulting in the use of internal combustion engines would, moreover, be of particular value because it is obtained without an increase in displacement. So, too, in the matter of speed there need be no limit set, unless for subsidized vessels it be a lower limit. If the reduction of weight of machinery and of fuel in the motor boat compared with the steam boat even approaches some of the expert estimates, there should be ample opportunity for securing high speed without being compelled to give the vessels abnormal dimensions.

The following conclusions appear to be justified:

- I. It is desirable that a limit be set to the draught of sea-going vessels.
- II. Government aid should not be extended to the building or operation of sea-going vessels whose draught exceeds 9.5 meters (32.2 feet).
- III. There should be an international agreement fixing the maximum dimensions of sea-going vessels built or op-

erated under government subvention, and there are tentatively suggested the following:

Length over all: 955 feet (275 meters).
Breadth: 105 feet (32 meters).
Draught: 32.2 feet (9.5 meters).

IV. Any maritime canal which has locks with a usable length of 1,000 feet (305 meters), a width of 110 feet (33.6 meters) and a depth of water on the sill of 35 feet (10.7 meters) will fulfill every reasonable requirement of commerce.

V. In a maritime canal a wet section 5 times as large as the immersed portion of the largest ship which is to use the canal is desirable, as also a depth of one meter under the keel; but these values are functions of the speed at which the

canal is to be navigated and therefore to some extent also of the volume of commerce, and are to be determined by local conditions.

It remains to be stated that the largest vessels on such special routes as the one between New York and European ports stand apart in a class by themselves, and their dimensions need not be taken into account in forecasting the dimensions of the vessels for whose use the great maritime canals such as the Suez Canal and the Panama Canal and other canals of the first rank are constructed.

A Common Language of Commerce

BY W. R. DAINGERFIELD

(The world is eagerly seeking new methods which will make easier the understanding between peoples. Well-concerted efforts are being made to assist the interchange of ideas among commercial and technical men of every land through Esperanto. One of the able spokesmen of this movement, Judge Daingerfield, is writing an instructive series of articles thereon especially for the Journal of Electricity.—The Editor.)

The Esperantists are renewing their activities since the close of the war. For some years their trend of effort has been mainly the establishment of groups of enthusiasts, who studied the language and corresponded socially with members of other groups in distant lands. Gradually these groups have established larger central representative groups, in provinces, in states and as national organizations. Thus the Esperanto Association of North America has its headquarters at West Newton, Massachusetts; the Kalifornia Rondero, representing the groups in California, has its headquarters at 946 Central Avenue, San Francisco; the Universal Esperanto Association is at 14 Museumsstrasse, Bern, Switzerland; and the office of the Common Commercial Language Committee, very recently organized, is at 211 West 138th Street, New York City.

Organization of Esperanto Forces —

The latter organization is a practical departure from the desultory methods of the past. The Common Commercial Language Committee expects to profit from the experience of similar organizations in England, Italy, Japan and other countries, by which substantial results have already been obtained. It renders services to all business men, and demonstrates to them that Esperanto is capable of meeting their real needs. It works in harmony with the West Newton and Bern organizations, but does not duplicate their work.

The West Newton organization is mainly for propaganda. It aims to introduce Esperanto into schools, and to encourage its use in literature and science. The Bern organization is international, and furnishes information to its members and aids them in travel. It has representatives in about 700 cities throughout the world. It is not a propaganda organization, though indirectly it exerts a strong influence in that direction.

The New York organization translates catalogs, price lists, circular letters and advertising matter into Esperanto, and circulates them in any country desired. It also translates from or into Esperanto any letter or document submitted. It secures agents and correspondents for every lawful purpose every-

where in the world, obtains trade information and other information from any country. Reasonable charges will be made for these services, with a view to bringing the Committee to a self-supporting basis.

Devising the Technical Vocabulary —

The naming in Esperanto of the various articles of trade, and of things that characterize a science, art or business, is an important and arduous task, but it is in a great measure lessened by applying one of the rules or principles of Esperanto, namely, that roots already common to at least a few of the leading European languages are ipso facto Esperanto roots, suffering no change except to conform the roots to the system of phonetic spelling characteristic of the language. When a nation is specially distinguished in some particular field—as the English in navigation, the French in the dry goods trade—the tendency of the Esperanto lexicographers is to prefer the selection of roots from the language of the nation making a specialty of the art or business concerned.

In the modern sciences the vocabularies of the national languages are very much alike. Esperanto strives to be international in its choice of words, and therefore its scientific terms are made as a rule from roots common to French and English. The readers of the Journal of Electricity will have no difficulty in recognizing such Esperanto words as *elektro*, *aparato*, *poluso*, *aero*, *oksigeno*, *hidrogeno*, *galvana*, *galvanizi*, *galvanometro*, *tensio*, *farado*, *volto*, *ampero* and *magneto*.

The technical dictionary of Charles Verax, published in 1910 in Paris by Hachette & Co., is the one mainly in use. Its definitions are in Esperanto, with the French equivalent for every term.

Importance of a Neutral Trade Speech —

When a national language becomes commercially important, like English, it tends to spread and is taught in foreign countries. It becomes a part of their school curriculum. But no such language can become international in any broader sense. National jealousies prevent. The other nations would never permit one living national language to dominate thus, over all others.

Now, no dead language is fit for modern uses. Hence the international language of commerce is to be a neutral artificial language or none. If such a language turns out to be more readily learnable than any national language, and at the same time fit for the scientist and literary man, so much the better. It is claimed that Esperanto fulfils these requirements, and has stood all tests.

From time to time short technical articles, as well as those on international subjects, will appear in the Journal of Electricity, in parallel columns with the English translation. This will present to the eye the conciseness of Esperanto, as each paragraph of the language will be printed alongside its translation. The student will thus gain a vocabulary with less effort than is ordinarily required.

Simple Grammar to be Presented —

In the short Esperanto grammar which is to be published in instalments in the Journal of Electricity, special attention is to be given to matters as to which English-speaking persons are likely to blunder. In certain respects the English language stands aloof from the languages of continental Europe. For example, the so-called English "long" sounds of the vowels, *a*, *e*, *i*, *o*, and *u*, if found at all in a Continental language, are represented by letters that are different from the English. On the other hand, the Continental languages are almost uniform in having as fundamental vowel sounds the sound of *a* in father, of *e* in met, of *i* in regime, of *o* in not, and of *u* like oo, in food. Furthermore, the English *j*, *q* and *w* do not closely resemble the corresponding consonants in other languages when such consonants appear. The result of these differences is to make a Continental language hard at first for an English-speaking learner to pronounce, while the Continentals have much less difficulty in this respect in learning one another's languages.

Other points of special difficulty to English-speaking learners who have never studied any foreign language will be mentioned during the course.

The Flexible Word-Order —

To be a good commercial language Esperanto ought to be so flexible and so cosmopolitan as to admit of almost any word-order, because the various languages do not have the same order of words. In English we say, "I have seen him." In French they say, "I him have seen." In German they say, "I have him seen." In Esperanto we say, "Mi lin vidis," "Mi vidis lin," or even "Lin vidis mi." "Li" means "he," and the letter *n* shows the accusative case, which in English we express by the word "him." To change the word-order creates confusion with most modern languages. But modern Esperanto, like ancient Latin, has great flexibility, and retains the same meaning whether one says, "Mi vidis lin" or "Lin vidis mi."

This is a valuable point in a commercial language; for, by using or listening to the Esperanto accusative *n*, one avoids the necessity of knowing the rules for word-order in the national language of the person with whom one talks, or of having rigid rules for word-order in Esperanto.

THE FOREIGN TRADE CLUB OF SAN FRANCISCO

(Nearly all our Pacific ports have organizations for promotion and study of overseas commerce. The following account of the activities of the Foreign Trade Club indicates the progressive manner in which these business bodies are advancing American interests.—The Editor.)

One of the vital forces in the commercial life of the Pacific Coast is the Foreign Trade Club of San Francisco. Through the aggressive attitude it has taken in behalf of American interests in the Pan-Pacific area, much good has been accomplished for our overseas trade, and every effort of this organization is directed to placing our sea-borne commerce on such a solid foundation that it cannot be shaken by changing world conditions.

The Foreign Trade Club, composed of representative exporters, importers, shipping and marine insurance men of San Francisco, is organized for the purpose of acquiring in a practical way accurate knowledge of the essentials of overseas commerce development.

Formed May 6, 1917, with a nucleus of thirty, it has now grown into an effective organization of five hundred members.

The Foreign Trade Club aims to develop a happier feeling of mutual confidence and esteem among all exporters and importers who visit our shores—to dissipate international prejudice and reveal to all foreign traders the spirit of fair play characteristic of American commerce. It seeks to indelibly impress on future overseas commerce the highest ideals of the age as exemplified by American principles of honor and democracy.

The constructive work of the club has included a very valuable lecture course, which is believed to be more comprehensive than any program undertaken by similar organizations. Every phase of international commerce is covered by the lecture schedule, which specifically indicates the necessary procedure in developing trade with each group of world markets. The lectures are delivered by recognized authorities in their particular fields, and at each meeting the members are privileged to listen to remarks from world merchants who are passing through San Francisco. In no sense is the information presented in an academic way; it is put forward with the world viewpoint always to the fore, and in that practical manner which will best prepare the members for the keen competition now prevalent throughout every trade field.

In explaining the significance of the work which the club is doing, President William H. Hammer points out some salient facts as to the present world trade situation, particularly affecting the United States. "America is at last awakening," he says, "to the urgent necessity of thoroughly training her young men for foreign trade service, and this vital measure for the future commerce of the nation is now recognized by the Federal Government. The study of the essential underlying principles of foreign trade is now being constantly urged by Government authorities.



AIRPLANE VIEW OF THE SAN FRANCISCO WATERFRONT

The Pan-Pacific countries undoubtedly represent the field of most rapid development in the world today. China newly come to life, growing Japan, Latin America, and the Western Coast of the United States itself, are working out problems on a new scale and putting forth ideas along technical, social and even international lines which promise to wield important influence in world developments. The electrical industry has an

especially significant role to play in making possible the growth of this great area, in fact, upon its development in large measure is dependent the prosperity and advance to which this region looks forward. It is highly appropriate that the Foreign Trade Convention of next year should be held in San Francisco, May 12th to 15th, 1920, to consider the "Problems of the Pacific."

"Exact knowledge of the requirements of foreign commerce is daily becoming more essential, and the successful world trader is equipped with a practical knowledge of the trade conditions prevailing in all countries.

"We shall have an enormous American merchant fleet of approximately 25,000,000 tons at our service after normal conditions are restored, and the call has been sounded to all patriotic Americans to prepare now that we may keep these vessels and the Flag afloat on all the trade routes of the world.

"The facilities of practically every manufacturing plant in the country have been expanded far beyond the normal capacity required for domestic consumption. It is obvious that an overseas market must be found at the end of the war for the surplus output of products of all kinds or the manufacturing interests will suffer tremendous losses.

"The members of this club deem it a patriotic duty, as well as of material personal interest, to supplement the work being promoted by the United States Government, to establish and make permanent, as well as reciprocally beneficial, the foreign trade relations of this country with other nations."

Commercial and political geography, salesmanship, advertising in the world trade field, commercial policies, diplomatic and consular practice, transportation and communication—all these are taken up in the addresses before the regular Wednesday evening meetings of the Foreign Trade Club, held in the assembly room of the Merchants Exchange building. But, as has been indicated, the activities of the organization are by no means restricted to educational effort. A strong stand has been taken in favor of securing more ships for Pacific ports, in advocacy

of the metric units of weight and measure (meter-liter-gram), and upon many other problems affecting world trade.

An annual dinner is held by the members of the club, and this is truly a unique feature of the organization. It is a rule that the banquet must be held aboard ship, and this year the annual affair is to be given on the splendid trans-Pacific liner, Tenyo Maru, early in November. Only members are gathered at these banquets, as there is a waiting list for reservations.

The officers of the Foreign Trade Club of San Francisco are: President, William H. Hammer; first vice-president, E. W. Wilson; second vice-president, E. G. Babbitt; third vice-president, C. E. Hydes (in charge of the educational lecture series); secretary-treasurer, William E. Hague.

LOCATING OIL BY ELECTRICITY

Oil is being located in Texas fields by means of an electrical device, based on the fact that oil and its constituents are the only minerals in the earth through which electricity cannot pass. An electrical circuit is formed by dropping an insulated wire to the bottom of a dry water hole, placing a series of batteries on top of the earth and attaching a land wire to the positive pole. The land wire is then taken out over the field in any direction and the territory thoroughly covered with electric currents flowing from the positive to the negative pole. An oil pool in the path of the current will force it to go around, and will also result in an appreciable current loss. Both these facts are registered on a delicate meter in the hands of the operator.

Hydroelectric Installations in Norway

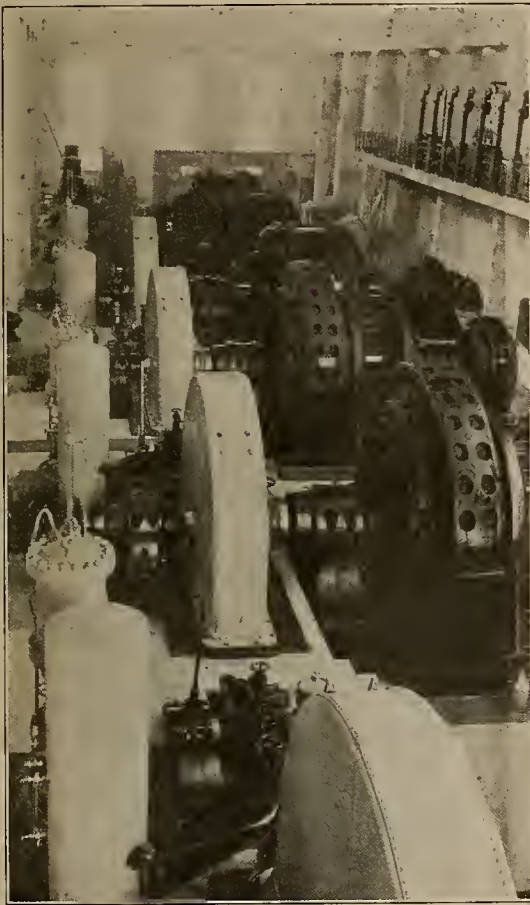
BY CHAS. H. TALLANT

(The varied requirements of hydroelectric installations have caused important and rapid development in hydraulic units. Interesting examples of the flexibility and efficiency obtainable are afforded in this account of two Norwegian plants in which a Pacific Coast turbine has established a rather unusual record.—The Editor.)

War conditions are happily responsible for a hydroelectric installation that furnishes forcible evidence of the flexibility possible in hydroelectric generating units. The installation is that of the electrolytic furnace plant of the Norsk Aluminum Company, Høyanger, Norway, where 7—4500-hp. Pelton impulse turbines, direct connected to 10,000-amp., 300-

for a complete alteration of the unit relations of generators and furnaces.

The revised plans necessary to meet these conditions provided for two groups of four banks of furnaces each, to draw current from a single main bus. The four banks of furnaces are connected in series, while the bus is fed by all the generators connected

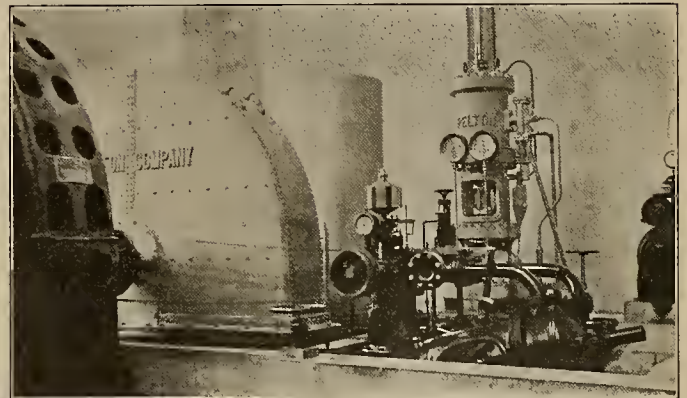


View of the installation at the Norsk plant showing all the seven units. Three of them are connected to the 1800-ft. head line, three to the 2400-ft. head line, while the remaining one is interchangeable and is tied in on both.

volt direct current generators, furnish the primary power. The interesting feature of the installation is the provision made to operate one turbine on either of two heads, 1800 feet and 2400 feet, at will.

Reorganizing Units —

The original plans for the plant called for duplicate individual units, each to consist of one hydraulic impulse turbine direct connected to a d.c. generator, and a single bank of furnaces. Each bank of furnaces was to receive power from its generator on an individual circuit. The furnaces were to be used for the electrolytic reduction of bauxite. A shortage of bauxite due to the war forced the company to the expedient of producing carbide and reducing iron ore if the plant was to continue in operation. For such service lower voltages are used and this called



View of the governing apparatus at the Norsk plant. Each governor is supplied with oil by an individual pump, direct connected to the main shaft of its own unit.

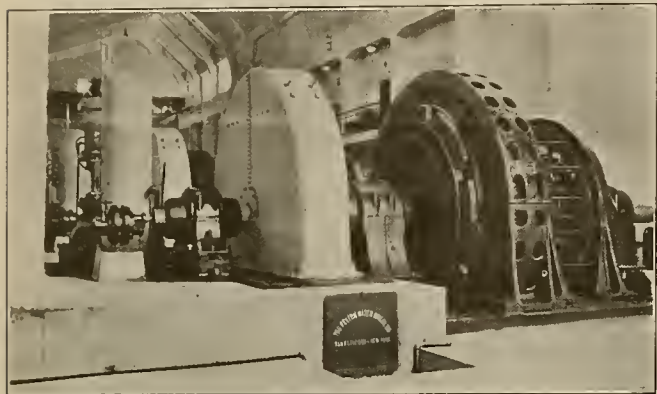
in multiple. The normal load of one group of four furnaces totals the normal output of three of the generators, but the group may be operated on the output of two generators in emergencies. This obviously calls for the continuous operation of at least two turbines per group.

Interchangeable Operation —

Two storage lakes, at different elevations, are the sources of the water supply, each normally to supply water for three turbines. The lower lake discharges into a 4000-foot penstock and develops an effective head of 1800 feet at the power plant. The higher of the two lakes, discharging into a 7000-foot penstock, will develop a head of 2400 feet, effective. To develop economical plant operation and to permit the shutting down of one or the other of the main water lines at any time, it was decided to tie on one turbine into both water lines, through tees and gate valves, this interchangeable unit to be capable of operating under either head. Three turbines are connected through a simple manifold to the 1800-ft. head line, three to be connected similarly to the 2400-ft. head line and the interchangeable unit to be tied in on both. The interchangeable unit normally will be idle, it being held in reserve in case it is necessary to shut down either of the main water lines, or any other individual turbine. Water was let into the machines in April, 1918, for testing, and the load was put on the following month, in actual plan operation.

One other interesting feature of the installation which developed was the behavior of the units on

reduced voltages. When changing electros, voltage is reduced on the bus to 60 volts, each generator taking its equal share of the load. The governing and regulation of the turbines is so exact that this voltage is held steadily, in spite of the decided un-



One of the units of the Norsk installation. When changing electros, voltage is reduced on the bus to 60 volts, each generator taking its equal share of the load.

stable tendencies of the generators at the reduced voltage. The governing mechanisms consist of Pelton direct motion oil pressure governors and auxiliary relief regulating nozzles. Each governor is supplied with oil by an individual pump, direct connected to the main shaft of its own unit.

The water control equipment of the installation is decidedly important and necessarily very complete with such a high head. At the penstock, automatic, self-closing butterfly valves are installed, capable of closing automatically if the water velocity in the pipe exceeds the limit fixed by the maximum demand of the turbines. In normal operation, however, these valves are opened and closed electrically by remote

control from the plant. Indicators on the main switchboard show the positions of the valves continually. The main gate valves at the turbines are hydraulically operated and built sufficiently strong to allow of their being opened or closed under full pressure, if necessary. (This feature was successfully tested after the water was let into the line.) The main gates are further equipped with emergency shut-down electric control to be operated from the switchboard, and with emergency manually operated control.

Economy of Space —

An installation by the same manufacturer at the electrolytic plant of Tyssefaldene Company, Tysedal, Norway, furnishes an interesting comparison between American and European practice. The Tysedal plant was originally designed for a number of moderate-sized turbine units of European manufacture, arranged to utilize the floor space with ample room between adjacent machines and walls, and at one end of the plant a small space was left, large enough to take a small unit, though none was planned for it.

Production demands increased rapidly and developed a need for 10,000 additional horsepower. The improved design which has been developed by American practice made it possible to install a 10,000-hp. unit in the small space which had been left and which could only accommodate a European unit of half that capacity. The American unit consists of a 10,000-hp., 1300-ft. head single overhung Pelton impulse turbine, direct connected to a Westinghouse direct current generator, and is used with the other machines for carbide, ferrosilicon and aluminum production.

Using the Manufacturer's Literature

BY HOWARD ANGUS

(The contractor-dealer frequently does not use to best advantage the literature supplied by the manufacturer. Here are a few of the ways in which it may be made to carry its message to the customer, summarized by the secretary of the California Electrical Cooperative Campaign. —The Editor.)



The Hartwell Electric Company of San Diego finds that some of the advertisements sent out by manufacturers make excellent pictures when framed, and will catch the customer's eye.

Manufacturers' literature is worth a great deal to manufacturer, jobber and contractor-dealer if distributed to the public, and is only scraps of paper if allowed to lie around idly. The entire electrical



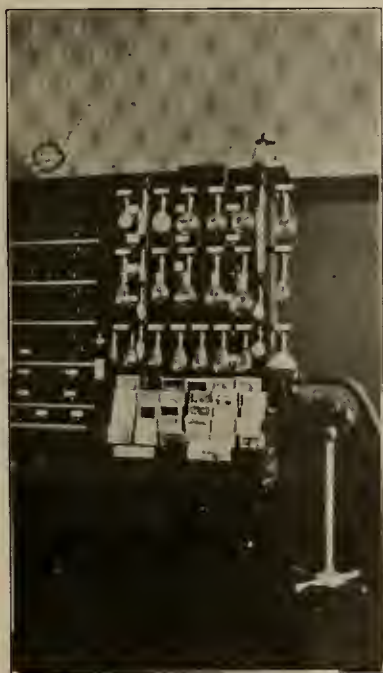
Framing advertising material and placing it in well-selected corners can have excellent results, as here where Snyder & Bell of San Bernardino use a mirror to double the effect.

industry is interested in the distribution. The field representatives of the California Electrical Cooperative Campaign have worked out several plans to get this literature to the public.



The Reynolds Electric Company of Santa Barbara maintains a neat and attractive rack for manufacturers' literature in a conspicuous place where the customer cannot fail to see it and where it is conveniently at hand for distribution.

Probably the most novel way is using the large manufacturers' posters as pictures and hanging them on the wall in frames made out of paper moulding. This serves two purposes—advertisement and decoration. The pictures are attractive, and make



A rack of the "please-take-one" variety is used by the Hartwell Electric Company of San Diego to promote the distribution of the smaller type of literature supplied by the manufacturer.

a blank wall look like a picture gallery. Many an unsightly wall has become an asset to the store because of these pictures. They are of advertising value, and each tells its story to every person entering the store.

Another method of distribution used with considerable success is a rack on the counter in which the manufacturers' literature is neatly arranged and from which the customers can help themselves. Two kinds are used, a wood case and a postcard rack. Both are very inexpensive to make. Both have worked very successfully.

Another method of distribution used with great success is wrapping literature in every package sold. The theory is that anybody buying an electric appliance, device or lamp is a prospect for something else electrical. The dealer is certain that the literature



A wall in the establishment of the San Diego Gas and Electric Appliance Company, San Diego, showing the highly artistic effect obtainable by framing these small colored posters and using them to adorn an otherwise bare wall.

will get into the customer's home. Tests have proven that the literature is read and many purchases have been traced directly to this method of distribution.

Some dealers use their mailing list of prospects with great success. Somebody has been in the store inquiring about some appliance or device. The dealer secures the name and mails them whatever literature he may have. When he wires a house, he follows his job up with literature of various appliances and secures the appliance business as well.

Some dealers keep a careful list of all customers making purchases and the articles purchased and from time to time mail literature on other appliances and devices. A wide-awake dealer secures a list of many prospects in many ways and mails literature to these, following up his letters and literature by calls from his solicitor.

Some dealers secure a boy to distribute their manufacturers' literature from house to house after school hours.

All these methods of distribution have been tried and proven successful. Many dealers in California are using one or two of these methods. Some all of them.

ARE YOU MAKING PLANS FOR CHRISTMAS?

The November 15th issue of the Journal of Electricity will contain many Christmas ideas, and will feature the newest schemes for washing-machine campaigns.

If you are looking for ideas to help you make this year's holiday a record

All-Electrical-Christmas

watch for these articles:

Christmas Windows Which Have Brought Results.

Shop Early Christmas Plans.

Suggestions for Christmas Merchandising.

Putting on a Washing Machine Campaign in Utah.

Methods of Washing Machine Merchandising in the Northwest.

The Idea of the Washing Machine Service Station.

PRACTICAL LESSONS IN ELECTRICITY

BY H. H. BLISS

(Service is the ultimate standard by which the value of all human undertakings is measured up. The following article, the last of the series published in connection with the Extension Divisions of the Universities of California and Washington, presents the science of electricity from this standpoint, with the three great mediums—cooperation, safety, progressive study—through which the industry is endeavoring to render better service to the public.—The Editor.)



A meeting of the California Electrical Cooperative Campaign in San Francisco. This energetic organization is doing most effective work in spreading the electrical idea and in inducing each branch of the industry

to cooperate with all the others for a common end—better service to the public and the mutual benefit which will accrue from an ever-increasing use of electricity.

INCREASING EFFICIENCY IN THE ELECTRICAL INDUSTRY

"Efficiency" is a word referring to the ratio between "output" and "input." An improvement in efficiency means the increase in return for a given input of effort, and the purpose of this paper is to indicate possibilities of such an improvement for the benefit of those engaged in the electrical industry.

The first point to bear in mind is that each electrical worker receives benefit, directly or indirectly, from everything which improves the industry as a whole. Therefore all movements toward raising the standard of service and enhancing the dignity of the electrical business should receive the enthusiastic support of every person in any way related to the business.

Erroneous ideas exist in the public mind regarding many phases of the electrical industry. It is worth patient and persistent effort to correct these and inculcate a feeling that the work of electrical men is of an importance and dignity certainly as great as that of any other industry whatever. It

rests upon the most advanced scientific research, it requires accurate technical knowledge, and it serves in ever increasing measure every civilized man and woman and child in the world.

It takes but little effort to speak favorably and enthusiastically of one's employer or company or of other concerns in related lines of work. It doesn't pay to "knock" even competitors—some of the most successful electrical men make it a practice to praise them—and it pays still less to speak slightly of one's own organization. The employees of power, telephone, traction and other public utility corporations have continual opportunity to present to their friends and to the public in general facts and ideas which will produce a better understanding of utility problems and greater sympathy and respect for the companies. Employees have "inside information" regarding problems and difficulties of which the public should know in order to appreciate the service it receives and to use with moderation and justice its powers of regulation. It must never be forgotten that one's success is bound up with that of one's company and of the industry in general.

California Electrical Cooperative Campaign.—In the state of California the whole electrical industry has achieved successful organization for the betterment of its service and the consequent improvement of conditions for all. The emblem adopted symbolizes the four great branches of the business—manufacturers, jobbers, central stations and contractor-dealers—connected by the campaign into a unified force for better service. The means adopted are cooperation and education; cooperation between the four branches and



Emblem of the California Electrical Cooperative Campaign

between the members of each branch, and the education of each member for more effective work and of the public to the value of electric service in all lines.

The major share of the work of the campaign is carried on with and for the contractors and dealers, for they form the largest class of members and the one most closely in contact with the public. Dealers are assisted in obtaining the best locations for their stores and in making them attractive and of service to the public. Rival dealers are shown how to cooperate with one another and competition becomes constructive instead of destructive. Advertising and selling campaigns are planned and carried out, with the help of power companies, jobbers and manufacturers.

The ideals of service underlying the campaign are suggested in this statement of policy: "It is recognized that the practice of proper accounting, of other good business methods and of good business ethics will result in companies and individuals being able to ask for their goods and service a price that will include a fair profit, and we hold that such exchange of goods, service and ideas for profit is legitimate and ethical, provided, that all parties in the exchange, including the customer, are benefited thereby.

"It is expected that the adoption of good business methods will also so increase the efficiency of the various branches of the electrical industry serving the public, that it will enable our industry to give the customer a better value for the dollar he spends for electrical service."

Industrial Accident Commission.—To prevent accidents from electrical apparatus the Industrial Accident Commission of the state of California has promulgated two sets of "Safety Orders," one applying to power stations and the other to electrical utilization in dwellings, vehicles, factories, stores, hotels, theatres, and other places of employment. A copy of either set of safety orders may be obtained free of charge by applying to the Commission, Underwood Building, San Francisco.

It is important that every man having to do with the installation of electric wiring or equipment should know and keep in mind these safety orders as well as the requirements of the Underwriters' Code. Contractors in particular should understand clearly

every point, and the Commission stands ready to give explanation and instruction to this end.

Attempts are sometimes made to lower costs by installing equipment which fails to come up to the requirements of the Safety Orders. Such action injures the public, the owner of the installation, and his employes, and hurts other contractors who are defeated by unfair competition. It lowers the prestige of the electrical industry and is thus an injury to every member of it.

Installations of good material which are made safe from fire and accident hazard cost more than others, and it sometimes requires tact to convince the man who pays for it that safety is worth what it costs. It is generally found, however, that the owner is more willing to do the right thing than some of the intermediaries between him and the contractor.

One California manufacturer recently built a new factory and was persuaded to have an electrical installation strictly in accordance with safety rules. Although he had at first objected strenuously to the expense, he was immensely pleased when he saw the results. "That high class equipment is the best investment I ever made," he said. "I get 18% interest on it in the saving in insurance, compared with the old factory." Construction up to standard benefits the owner, his employes, the contractor and the electrical industry in general.

Technical Study and Reading.—To get the maximum return for one's effort it is necessary to possess a trained and effective mind. Hence technical education is an important factor in personal efficiency. Polytechnic high schools, colleges and universities offer technical education to those who can spend their full time for several years in this sort of preparation, while those who must "earn while they learn" have excellent opportunities in evening public and private schools, commercial correspondence courses and in University Extension class and correspondence instruction. Hundreds of courses are offered by the Extension Division of the University of California alone. The correspondence instruction is available to everyone, whether a resident of the state or not. Many other universities have extension departments, and anyone who desires self-improvement may obtain valuable information by addressing inquiries to them.

Education for efficiency is a continuous process, and it does not end at the conclusion of a single course. Readers of this series are urged to make it a practice to read regularly and carefully every copy of the Journal of Electricity. It is well to subscribe for and study such magazines as the Electrical World, Electrical Merchandising, the General Electric Review, the Electric Journal, etc., making the selection in accordance with one's branch of work and amount of technical preparation.

Books should be bought, studied and kept for reference by everyone in electrical work. Numerous excellent works on technical subjects are published by the McGraw-Hill Book Company and John Wiley & Sons (both of New York City) and the Technical Publishing Company of San Francisco. Lists of

books dealing particularly with the branches in which one is interested are obtainable from these publishers on request. Among the books especially valuable for persons who have been studying this series of lessons in electricity may be mentioned Terrell Croft's "Practical Electricity," "Electrical Machinery," and "Practical Illumination"; Alexander Gray's "Principles and Practice of Electrical Engineering;" C. M. Jansky's "Electrical Meters," and W. H. Timbie's "Essentials of Electricity." The last is published by Wileys; the others by McGraw-Hill.

In reading books and periodicals one should not hesitate to read chapters and articles which seem difficult to understand, if the subjects are interesting. It will be found that power to assimilate such material is acquired almost unconsciously, and that things not fully understood become clear in the light of later study.

One should read regularly, daily, and with economy of effort, keeping always in mind the central thought of the article. Practice of this kind will develop the ability to obtain the greatest possible amount of knowledge for the amount of effort which can be devoted to study.

ELECTRIC UTILITIES OF CALIFORNIA

(The following inclusive and accurate data regarding the electric systems of California has been especially furnished to the Journal of Electricity by the California State Railroad Commission.—The Editor.)

There are eighty-four electric utilities in the state of California, operating seventy-five hydro-electric plants, with an installed capacity of 465,000 kilowatts, and fifty steam plants with an installed capacity of 305,000 kilowatts, making a total of one hundred and twenty-five plants, aggregating 770,000 kilowatts.

During the year 1918 these plants generated a total of 2,892,000,000 kw-hr., of which 2,163,000,000 kw-hr., or 75% of the total, were produced from water power.

This power is transmitted through 7,300 miles of high tension transmission lines to points of distribution, from which 84,000 miles of secondary distribution lines extend. Electric service is supplied to 545,000 consumers.

The following statement summarizes the revenues and operating expenses of all California Electric Utilities for the year ending December 31, 1918:

Revenues:

From Municipal Lighting	\$ 1,756,000
From Residence and Com'l Lighting.....	12,793,000
From Sales to other Electric Utilities....	3,681,000
From Power	20,582,000
Miscellaneous	740,000
	\$39,552,000

Operating Expenses:

(Including Maintenance and Repairs)

Production Expenses	*\$10,114,000
Transmission Expenses	741,000
Distribution Expenses	2,721,000
Commercial Expenses	1,568,000
Gen'l and Miscellaneous Expenses.....	1,788,000
Other (Mdse., Steam Sales, etc.).....	605,000
Taxes	2,600,000
Depreciation	2,445,000

Total Operating Expenses, \$22,582,000

*Of which 4,742,000 was for fuel oil, and \$2,853,000 was for purchased energy.

The installed capacity of consumers' lights, motors and other power-consuming devices exceeds 1,800,000 horsepower. Nearly 900,000 kilowatts of distribution transformers are installed on these systems.

Past Growth and Future Estimates, Northern California —

The following figures for the years 1915-1918 inclusive are based on the actual output of the five principal systems supplying Northern and Central California.

The figures given for 1919-1922 inclusive are estimates of the necessary output and peak load of these systems to fulfill the growing demand for electricity in Northern California.

	Millions of Kw-hr.	Peak Load in Kw.
1915.....	1,220	220,000
1916.....	1,360	240,000
1917.....	1,510	260,000
1918.....	1,680	300,000
1919.....	1,850	340,000
1920.....	2,050	365,000
1921.....	2,250	400,000
1922.....	2,450	445,000

For the territory supplied by these five companies alone, it is estimated that additional generating facilities must be provided at a rate of not less than 30,000 kw. per annum, which will entail expenditures of at least \$5,000,000 per year for power stations and transmission facilities alone. This does not take into account an equally large expenditure for distribution and other facilities necessary to deliver this power.

Developments Now in Progress —

At the present time there are under way hydro-electric developments and transmission line construction in California which total an expenditure of \$22,000,000 and will render available within two years an additional 120,000 kilowatts of generated capacity.

The four main projects under way are the construction of the Caribou Plant of the Great Western Power Company on Feather River, which is now being installed to a capacity of 40,000 kilowatts, although much of the hydraulic construction is sufficient for the ultimate installation of 120,000 kilowatts.

The San Joaquin Light and Power Corporation is making rapid progress on its new Kerckhoff Plant, which when completed will have an installed capacity of 30,000 kilowatts.

The Southern California Edison Company is building a 30,000-kilowatt plant, to be known as Kern River No. 3, and the City of Los Angeles is now working upon an additional power plant, utilizing the waters of the Aqueduct in a drop in San Francisquito Canyon. This plant will be of 20,000-kilowatt capacity.

In addition to these new generating plants, several hundred miles of high tension transmission lines, operating at 110,000 to 150,000 volts, are now under way.

SPARKS—Current Facts, Figures and Fancy

(Solving the street car fare problem by abolishing fares, meeting the difficulties of transporting mine machinery in Mexico by using aeroplanes, and discovering insulation defects before using by the use of the X-ray are among the week's suggestions. No remedy is proposed for the spiders of Argentina, however—and the complications of the French labor problem present elements of the impossible.—The Editor.)

The investment in electric railways of this country amount to \$6,000,000,000, according to statistics submitted to the Federal Electric Railway Commission.

* * *

According to recent figures in a Japanese newspaper, 96,000 out of 125,000 employes in 42 spinning mills were women, some 5,000 of these being under fourteen years of age.

* * *

Thursday, October 21st, was the 40th anniversary of the incandescent lamp. It was on October 21, 1879, that Thomas A. Edison took out the first patent on his incandescent lamp.

* * *

It is reported that when the Germans proceeded to reconstruct certain parts of French territory, in accordance with the requirements of the peace treaty, the French labor unions protested against "cheap foreign labor" and demanded that the German receive the same wages as themselves.

* * *

More than thirty miles from the nearest railway station, on the shore of Richardson Lake in Maine, is an isolated telephone pay station. Numbers of emergency calls have been turned in over this telephone which has been the means of saving the lives of many hunters and woodsmen injured in this region.

* * *

Somebody in England has realized that the audience is half the fun in a theatre, and is planning to have a mirror drop curtain so that you can study the dress circle from the orchestra without turning your head. The curtain will be raised and lowered by electric power, and will have air cushions to prevent jarring when the curtain touches the stage.

* * *

Most people take a morbid delight in statistics on the high cost of living these days. Here are some: The cost of living has gone up 102% in the United States, 107% in Canada, 133% in England and 200% in France since the beginning of the war, according to the results of an investigation just completed by economists of the War Trade Board.

* * *

Spiders are responsible for quite a number of troubles on the telegraph lines in Argentina and Brazil. The ground spider spins a heavy web which the wind wraps around the wires in great masses, and when these become damp, short circuits are formed. Trouble men are obliged to follow the wires across the country and remove the webs. Of course

the spiders they grow in South America are not the small and harmless insects to which we are accustomed.

* * *

A silent alarm clock is a new invention which will appeal to anyone who sleeps across the hall from a commuter. It consists of a nitrogen tungsten lamp of high wattage mounted within a reflector and adjusted near the bed so that the light falls on the pillow. The light is controlled by a time switch or by an alarm clock arrangement which turns on the current at the set time.

* * *

The X-ray has been found very useful in the examination of timber up to 18 in. thick. Internal knots, rosin pockets, cracks and grub holes can be easily detected—an invaluable aid in aeroplane construction. Another important use of the X-ray is in ascertaining the purity of insulating materials for electrical use. Small metallic specks in fibre or mica, for instance, can be detected instantly.

* * *

A new fire hazard was recently discovered in a grain elevator. After three fires had occurred in the same elevator in one day, investigation showed that wheat dust collecting on an ordinary 16 candle-power, 55-volt incandescent lamp ignited, fell to the floor and set fire to the litter. The defect was corrected by the installation of double globes which reduce the heat slightly without marring the light.

* * *

A proposal has been made in Mexico that an air service should be operated between certain mines and stations for transporting machinery and supplies to the mines and returning from the mines with bullion and ores. Nearly all the mines are located in the mountains, and it is almost impossible for the companies to get in any machinery which is too heavy to be transported on the back of a burro. The principal drawback to the air service plan would be the establishment of suitable landing places.

* * *

The latest solution of that all-absorbing problem, street car fares, is to abolish them entirely. A suggestion has been put forward that cities should run street cars just as owners of skyscrapers run elevators, with no charge to the passengers, and that the business community should be glad to pay the expense. The suggestion argues that if it is good business for the public to take toll off roads and bridges and spend tremendous sums in maintaining them for the use of the people, it is better business to take over the moving highways, the service being more a social than a transportation problem.

PERSONALS

C. F. Uhden, of Spokane, has been selected to have charge of the proposed hydroelectric development on the Skagit river for the city of Seattle. He will have full charge of all the engineering details and work is to be started in the near future. Under the provisions of an ordinance passed in September by the Seattle city council authority was conferred upon the board of public works to draw plans and specifications for the construction of a power plant at or near the mouth of Gorge Creek, capable of developing

50,000 horsepower of electrical energy. Preliminary work has already been done on the project which is estimated to cost of \$5,500,000. Much confidence is being expressed in the ability of the city of Seattle to put this splendid new plant into operation at an early date under the constructive vision of Mr. Uhden.

C. V. Schneider, electrical contractor at Sacramento, California, is roughing it in the high Sierras.

E. C. Mixer, who has been in the electrical business in Modesto, has opened a new store in Lodi, California.

James W. Fenwick, assistant manager Hawaiian Electric Co., Ltd., of Honolulu, is a recent San Francisco visitor.

F. J. Zorn, manager of the Pacific States Electric Company at Seattle, spent a few days recently in Bellingham and vicinity.

George H. Kuhrts, general manager of the Los Angeles Electric Company, is among recent notable visitors to San Francisco.

James Lyman, an electrical engineer with Sargent & Lundy, mechanical and electrical engineers of Chicago, is a recent San Francisco visitor.

S. Herbert Lanyon, sales engineer at San Francisco, has been appointed Pacific Coast representative of the Lapp Insulator Company of Le Roy, N. J.

John J. Gibson, manager of the supply department of the Westinghouse Electric & Manufacturing Company of East Pittsburgh, is a recent San Francisco visitor.

Louis A. Lewis of the commercial department of the Washington Water Power Co., has been appointed secretary of the Northwest Light and Power Association.

Miles F. Steel, Pacific Coast manager of Benjamin Electric Company, is again at San Francisco after a trip to Chicago, from which he returned via Seattle and Portland.

Barney Badrian, for four years Western traveling salesman for the Hurley Machine Company, has been appointed district manager by that company for the Pacific Coast district.

C. E. Heise, San Francisco manager of the Westinghouse Electric & Manufacturing Company, is back again in his San Francisco office after an absence of several weeks in business centers of the East.

Orville R. Graves, previously with the San Francisco office of the Pacific States Electric Company, has been transferred to the Seattle office of the company, taking a position in the sales department.

C. M. Lindsay, advertising manager of the Edison Electric Appliance Company, Inc., with headquarters at Chicago, has resigned to become associated with the advertising de-

partment of the Journal of Electricity and Electrical Merchandising.

Alfred G. Potts, sales engineer with Gunn, Carle & Company, San Francisco, has been spending some time in Los Angeles. While there he visited the Southern California Edison Company's establishment.

Donald I. Cone, electrical engineer with the Pacific Telephone & Telegraph Company, announces the arrival in his family of Ruth Dorothy on October 10th. The Journal of Electricity offers its congratulations.

M. S. Vittenberg, manager of the Tomsk (Siberia) branch of the Russian General Electric Company, has come to the United States for an extended business tour. He will return to Siberia by way of San Francisco.

W. T. Andrews, who for twelve years has been connected with the forest service in the Northwest in the capacity of logging engineer, has resigned to become forest evaluation engineer for the Bureau of Internal Revenue.

John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, has returned to his San Francisco office after an absence in the East of some weeks in the interest of public policy activities for the N. E. L. A.

F. D. Egan, former works manager of the Pittsburgh Iron & Steel Foundries Company, has accepted a position in the general engineering department of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa.

H. T. Carlton, construction engineer for the Southern California Gas Company with headquarters in Los Angeles, is a recent San Francisco visitor. Mr. Carlton was formerly chief designer for the Rieber Laboratories in San Francisco.

Philip K. Condict, vice-president of the International Western Electric Company and recently honored by the Emperor of Japan with the Order of the Rising Sun, arrived in San Francisco from the Orient during the second week in October.

W. Brewster Hall of Pass & Seymour, New York, and George A. Gray, of the George A. Gray Company of San Francisco, under whose management the new Pass & Seymour San Francisco store was recently opened, are at present visiting Seattle.

Louis T. Wohlgroth, an engineer with the Swiss Economic Mission now making a tour of the United States, is a recent San Francisco visitor. Mr. Wohlgroth is particularly interested in the manufacture of gas for illuminating and power purposes.

Carlos E. Artigas of the Artigas Rio Frio Company, Valparaiso, among the large shipbuilders in Chile, has been in San Francisco for some time with the consulting engineer of the company, Leo Pender, looking into the purchase of ships and the equipping them with modern electric installations, including the developments of San Francisco manufacturers.

C. C. Davis, field representative of the California Electrical Cooperative Campaign for the San Francisco district,

resigned Nov. 1st to become manager of the electrical department of the Turner Hardware & Implement Company of Modesto, California. Mr. Davis, though engaged in activities of the Campaign for but eight brief months, has nevertheless made his influence for good keenly felt through his district. His loss to the campaign is announced with sincere regret, but the best of good wishes are heard on all sides for his future

success in his new undertaking where as a contractor-dealer he will have abundant opportunity to put into practice the gospel of cooperation he has so earnestly preached.



Jos. McElroy, 3rd, export sales manager for Pass & Seymour, Inc., with headquarters in New York City, has been



making an interesting survey of how to increase friendly commercial relations with our foreign neighbors. His investigations have as a rule been used to draw forceful conclusions such as would interest men of the United States. On another page of this foreign issue of the Journal of Electricity appears a timely and helpful article by Mr. McElroy which will primarily be of interest to foreign merchants. This new angle of

discussion will undoubtedly prove most effective in aiding the Journal of Electricity in its present drive to bring closer together all members of the electrical industry in Pan-Pacific countries.

C. P. Bowie, engineer in charge of the San Francisco office of the Bureau of Mines, went East to attend the dedication exercises of the Bureau of Mines Research Laboratories at Pittsburgh. He plans to visit the various stations of the East before he returns.

Charles H. Pierson, advertising agent of the Southern California Edison Company, Los Angeles, California, has been appointed chairman of the Motion Picture Films Division of the Advertising and Publicity Service Bureau of the Commercial Section, N. E. L. A.

O. W. Peterson, who for the past year has been installing hydroelectric work at Unsan, Chosen (Korea), is again back in San Francisco. Mr. Peterson formerly had charge of the raising of the Spaulding Dam to its present height for the Pacific Gas & Electric Company.

H. A. Barre, electrical engineer with the Southern California Edison Company, and S. J. Lisberger, engineer San Francisco distribution, Pacific Gas & Electric Company, have gone East to represent Pacific Coast companies at a meeting of the National Committee on Inductive Interference and Overhead Systems with the Bureau of Standards.

T. J. McGrath, general manager of the Hawaiian Electric Company, Ltd., returned to Honolulu on the SS. Lurline, sailing October 14th, after having spent more than a month in San Francisco. James F. Fenwick, assistant manager of the same company, has also been in San Francisco on a business trip.

Robert Sibley, editor of the Journal of Electricity, has been appointed to membership in the Publication Committee Division of the Advertising and Publicity Service Bureau of the Commercial Section, N. E. L. A., and also in the Motion Picture Films Division.

E. N. Tandberg, electrical engineer, has returned to the United States to take up professional work, after having

spent many years in China. Mr. Tandberg went to China in 1903 and had extensive engineering experience throughout the Orient. He was last with the China Electric Company, Peking and Shanghai. Recently Mr. Tandberg gave an interesting address before the Foreign Trade Club of San Francisco and presented members with his bilingual business card, which is reproduced herewith—one side being in English, the other in Chinese.



W. Brewster Hall, formerly representing Pass & Seymour, manufacturers of porcelain wiring devices, is making his farewell trip to the Northwest before turning the line over to George Gray, formerly representing Crouse-Hinds Company on the Coast. Mr. Gray will have his headquarters at San Francisco.

R. H. Ballard, vice-president of the Southern California Edison Company and president of the National Electric Light Association, has just returned from the East. As Mr. Ballard passed through San Francisco he delivered a stirring address before the Employees' Association of the Pacific Gas & Electric Company.

D. C. Henny, consulting hydraulic engineer of Portland, Ore., and recently appointed chairman of the Oregon committee working for the formation of a department of public works, was the victim of a typographical error in our last issue where he appeared as D. C. Henry. We take this opportunity to correct the error and apologize.

C. M. Bliven, who has been associated with the General Electric Company sales organization at San Francisco, Los Angeles and Seattle, for many years, recently resigned his connection with that company to become associated with the Pacific Coast sales organization of Wellman-Seaver-Morgan Company, with headquarters at San Francisco.

Peter S. Klees has announced his resignation as manager of the Franklin Incandescent Lamp Works of the Westinghouse Lamp Company, New York City, to become associated with the Pierce Fuse Corporation of Buffalo, N. Y., as vice-president and general sales manager.

R. H. Ruth has opened up a business in Rochester, N. Y., which will probably be known as the "Ruth Electric Shop." He will specialize on household electrical appliances. Mr. Ruth was for fifteen years with the Benjamin Electric Manufacturing Company, working in contact with the New York office of the concern but in complete charge of the Pittsburgh territory.

Louis Etshokin has accepted the position of Pacific Coast sales agent with the Halcum Radio Company of San Francisco. During the war Mr. Etshokin was junior lieutenant in charge of radio and signal detail at Goat Island, San Francisco. He is familiar to readers of the Journal of Electricity as author of the series of technical hints on contracting practice now appearing in the Journal.

Ellery W. Stone, formerly lieutenant in the U. S. Navy, has resigned from the service and has accepted the position of resident engineer and agent at San Francisco of Kilbourne & Clark, the well known Seattle manufacturers of radio equipment. Lieut. Stone was in charge of the government radio work in Southern California during the war and has held other positions of importance in this field previous to that time.

OBITUARY

Frank J. Somers, president and general manager of the Century Electric Company of San Jose, died recently at his



home in San Jose, California. Mr. Somers was widely known throughout the West as a leader in the contractor-dealer movement. He served a year as president of the California Association of Electrical Contractors and Dealers, during which period this movement received much of its impulse throughout the West at a time when the California Electrical Cooperative Campaign was first being launched and at a time when

the Pacific Coast Section, N. E. L. A., was broadening its activities so as to embrace all branches of the electrical in-

dustry. His loss will be sadly mourned by electrical men throughout the West.

Joseph H. Newlin, for more than fifteen years past superintendent of the Fresno City Water Company, and purchasing agent for the San Joaquin Light and Power Corporation, was suddenly stricken while talking over a business proposition with associates, at his desk, in his Office on October 6, passing away a week later on October 13. The death of Mr. Newlin has been a shock to the community as it had not been generally known that he was ill. Until the time of his sudden attack he had been enjoying the very best of



health despite advancing years. Owing to his long service as head of the Fresno City Water Company, and to the important position he held with the San Joaquin Light & Power Corporation and its subsidiaries, Mr. Newlin became well known throughout the West and the electrical industry in the East.

Mr. Newlin and his family moved to Fresno January 1, 1904, on which day he took up his duties with the Fresno City Water Company and the San Joaquin Light & Power Corporation.

M. E. Newlin, his son, is well-known as district agent for the San Joaquin Light & Power Corporation.

Charles L. Easton, electrical superintendent of the coast properties of the San Joaquin Light & Power Corporation and the Midland Counties Public Service Corporation, and for many years a resident of Fresno, suddenly passed away on the evening of October 5th, at his home in Santa Maria. He was sick only a couple of hours, death being due to heart failure brought on by the effects of influenza of several months ago.

Mr. Easton had much to do with the development of the electric drive in the oil fields of California. His son, Frank A. Easton, is superintendent of gas properties for the San Joaquin Light & Power Corporation; his brother, Fletcher A. Easton, is assistant agent, Fresno district, of the same company.

Books and Bulletins

Elements of Radiotelegraphy

by Ellery W. Stone, Lieut. N. S. N. R. F., Member Institute Radio-Engineers U. S. Naval Institute. 267 pp. Size $5\frac{1}{4} \times 7\frac{1}{2}$ inches. Published by D. Van Nostrand Company, 25 Park Place, New York, and on sale at the Technical Book Shop, San Francisco; price \$2.50.

This volume, though written mainly for the instruction of radio students in the Communication Service of the Navy, is applicable to the needs of civilian radio schools and also of those interested in the subject from a non-professional standpoint. The treatment avoids the mathematical attitude as far as possible, and is such that the subject matter may be easily grasped by the layman. Though a knowledge of elementary physics and simple mathematics is desirable for a study of the text, it is not necessary. The volume comprises eleven chapters which are carefully subdivided. It is excellently arranged and well printed. The numerous illustrations—frequent line drawings, and some thirty-three plates—are a great addition.

The Trans-Pacific Magazine

Established with the idea of bettering fundamentally the relations between the countries on the Pacific by a sympathetic and non-partisan attitude, The Trans-Pacific Magazine has made its appearance in Tokyo. This financial and economic weekly, designed to be of international service, is a well planned periodical, the English section being supplemented by Japanese and Chinese sections under the editorship of natives, the whole enterprise being the work of B. W. Fleisher, editor and proprietor of the Japan Advertiser.

Observers of Far Eastern affairs will welcome The Trans-Pacific as promising to be an interesting forum for the views of Japanese, Chinese and Americans on the development of the Far East.

Foreign Trade Literature

To those studying the merchandising of electrical goods in Pan-Pacific lands, the reports on this subject issued by the Bureau of Foreign and Domestic Commerce are of unusual interest. Among the reports of special agents printed to date are those covering the electrical trade in New Zealand, Australia, Ecuador and Peru, Bolivia and Chile. Copies of the pamphlets can be secured at a nominal price from the San Francisco or Seattle office of the Bureau.

Miscellaneous

A recent catalog from the Sprague Electric Works of the General Electric Company deals with Safety Panel Boards and Cabinets.

The Ohio Brass Company of Mansfield, Ohio, sends out a folder on "How to Make a Good Trolley Splice."

"Typical Graphic Records," published by the Esterline Company of Indianapolis, reproduces a number of curves showing industrial data secured with the company's graphic recording instruments.

The "Emerson Monthly," published by the Emerson Electric Manufacturing Company, St. Louis, devotes the greater part of its September issue to small motors.

The September issue of the G-E Advertiser is a building number featuring home electrical appliances.

A well-illustrated attractive little booklet appears as the bulletin of the Philadelphia Electric Company—"published every little while for the information and in the interest of customers." The latest issue contains among other things data on washing and ironing machine efficiency and savings, and on the labor-saving capacity of the dishwashing machine and the vacuum cleaner.

Allis-Chalmers Bulletins

Three recent well illustrated bulletins come from the Allis-Chalmers Manufacturing Company, Milwaukee, Wis. The first describes the machinery and appliances which make up the equipment of a rock crushing plant, the second deals with a bag filter type of dust collector recently designed and patented by the company, the third contains an account of the McDougall Roasting Furnace built by the company and installed at various important smelting plants.

New House Organ

Under the title of "The Grid" appears the first number (October, 1919) of an interesting little house organ, to be published quarterly by the Edison Storage Battery Company, Orange, N. J. It contains good material and is well edited. We wish it luck.

Good Lighting

A neat catalogue has been issued by Harvey Hubbell, Inc., of Bridgeport, Connecticut, describing and illustrating the line of Hubbell Reflectors for industrial plant lighting.

The National X-Ray Reflector Company sends out an artistic folder under the title "Eye Comfort," illustrating the use of reflectors in all kinds of home and commercial lighting.

Meeting Notices for Electrical Men

(The N. E. L. A. Convention for 1920 has been definitely announced for May 18th to 21st at Hotel Huntington, Pasadena, Cal. Two other national conventions, the Electrical Supply Jobbers' Association and the Foreign Trade Congress, are scheduled for the Pacific Coast during the coming year. Of immediate interest are several local meetings of importance which have taken place during the past two weeks.—The Editor.)

Electrical Contractors and Dealers' Association of San Francisco

At the meeting of the San Francisco electrical contractors and dealers, October 10th, unanimous decision was made to join in a body the state and national organizations of contractors and dealers. This movement for 100% membership came after an address urging support of the larger bodies, by J. W. Redpath, secretary of the state association. A summary of the provisions of the proposed new municipal ordinances governing electrical installations and contracting was given, and their adoption by the Board of Supervisors recommended.

Among the guests of the association at this meeting was T. J. McGrath, general manager of the Hawaiian Electric Co., Ltd.

The session of October 17th was taken up with discussion of practical problems affecting the industry. Vice-President W. B. Kohlwey presided.

The meeting of October 24th was addressed by Arthur Rowe, who made an eloquent appeal for unselfish cooperation among electrical men. Mr. Rowe gave an account of the funeral ceremonies of Frank J. Somers of San Jose, and told of the movement toward organization among electrical contractors and dealers in that city. President Clyde L. Chamblin outlined the conditions in the industry in southern California, whence he had just returned.

During the month the Retail Section of the association held several successful evening meetings in the States Cafe, under the leadership of W. B. Kohlwey, chairman. On October 14th the section was addressed by C. C. Davis of the California Electrical Cooperative Campaign, who gave an instructive talk on "Stock and Turnover." Another meeting and dinner was held on October 21st, and J. W. Redpath, secretary of the California Association of Contractors and Dealers, spoke on Advertising. A general discussion followed, the consensus of opinion favoring the taking of a page each week in some San Francisco daily newspaper for the purpose of promoting the electrical trade, especially during the Christmas holidays.

San Francisco Electrical Development League

The meeting of the San Francisco Electrical Development League, October 13th, was featured as "Past Presidents' Day." Former chief executives of the league graced the head table with their presence, and several of them addressed the gathering. Friendly counsel, based on past experience, was given by Col. Carter, R. E. Fisher, Garnett Young and T. E. Bibbins.

Resolutions of condolence were sent to the families of Frank J. Somers of the Century Electric Company, San Jose, and Joseph H. Newlin, of the San Joaquin Light & Power Corporation, both of whom passed away on the morning of the meeting.

M. M. O'Shaughnessy, city engineer of San Francisco, addressed a large meeting of the league on October 20th, his topic being "The Hetch Hetchy Project." Mr. O'Shaughnessy gave an interesting account of the history of the project, and described the work at present being done, with particular reference to the electrical development at Power Houses 1 and 2. At the latter, 66,000 horsepower will be developed.

He told also of the construction work about to commence on the Hetch Hetchy Dam, the contract for which has been awarded to the Utah Construction Company. Mr. O'Shaughnessy urged cooperation with the municipality in carrying the project to speedy completion.

Electrical Mass Meeting

A highly interesting meeting under the auspices of the Pacific Service Employees' Association was held in the Scottish Rite Auditorium, San Francisco, on Friday evening, October 24th. After musical numbers contributed by Pacific Service members, John H. Britton, vice-president and general manager of the Pacific Gas & Electric Company, A. E. Wishon, assistant general manager of the San Joaquin Light & Power Corporation, and R. H. Ballard, president of the National Electric Light Association, took the platform. Mr. Wishon, the first speaker, called attention to

the important part which the West is now playing in electrical activities, and to the Electric Light Association under Mr. Ballard's leadership, and the new stimulus given by the Geographic Section idea.

Mr. Britton in introducing Mr. Ballard warmly praised his ability to communicate his own enthusiasm to others, as demonstrated on his recent Eastern trip, on which Mr. Britton accompanied him. Mr. Britton expressed his confidence that the Pacific Coast Section N. E. L. A. was standing solidly behind Mr. Ballard, and added a few remarks on the responsibility of the individual members of the public utility in the formation of public opinion.

Mr. Ballard, after a few preliminary remarks, took up the subject of the N. E. L. A. Convention, to be held in Southern California in the spring of next year. He stated that this convention would differ from previous ones in one very important respect, namely, that the meetings would all be joint meetings and the "three-ring circus" plan would be dispensed with. By this means they hoped to secure greater

BUILDERS OF THE WEST — LXIV



JOHN BARRETT

Permanent friendship among the world's peoples is an ideal which many have aspired to serve. To few men have come such opportunities for that splendid service as to one who for twelve years has helped maintain the peace and amity of half the world, as Director General of the Pan-American Union. Commencing his career as a journalist in San Francisco, Portland and other cities of the Pacific Coast, he entered the diplomatic field as minister to Siam. Several years he devoted to intimate study of Pan-Pacific problems; and in his later duties as a leader among all the American republics, he was never forgetful of the interests of the vast Pacific area. To John Barrett, therefore, this issue of the Journal of Electricity is affectionately dedicated, in appreciation of his consistent aid to the commerce and industry of the West, and of the lands beyond the West.



THE SCENE OF THE 1920 N. E. L. A. CONVENTION

The beautiful Hotel Huntington, Pasadena, which will be entirely given up to the electrical industry of the nation from May 18-21, 1920.

cooperation between different branches of the industry, and a better mutual understanding.

The evening concluded with a one-act play presented by the Pacific Service Players' Club and was followed by dancing.

San Jose Association of Electrical Contractors and Dealers

The San Jose Association of Electrical Contractors and Dealers was organized on Wednesday, October 22nd, with 100% membership and 100% enthusiasm. The meeting was addressed by Clyde L. Chamblin, president of the San Francisco local and incoming president of the state association. Arthur Rowe of San Francisco also assisted in the organization, which was along the same lines as those of the San Francisco association. Charles Fraser was elected president.

Electrical Cooperative League

The feature of the October 22nd meeting of the Electrical Cooperative League of Los Angeles was an address by A. Emory Wishon, assistant general manager of the San Joaquin Light & Power Corporation, on "Self-Interest in Electrical Development."

Ralph B. Clapp presided at the meeting, and entertainment was provided by the Pension Octette of the Southern California Edison Company.

A. I. E. E., Seattle Section

At a meeting of the Seattle Section of the American Institute of Electrical Engineers held on October 21st and address was given by C. Sweet on "Motor Driven Auxiliaries on Motor Ships." The paper described novel adaptations developed under Mr. Sweet's direction, of electric motors to the driving of hoists, winches, etc., replacing the usual steam equipment on motor-propelled ships.

Portland Section, N. E. L. A.

A joint meeting of the Portland Section N. E. L. A. and the American Institute of Electrical Engineers will be held in Portland on November 18th. Dr. Jewett, chief engineer of the Western Electric Company, will address the meeting on "The Development of Communication of Intelligence During the War."

THE N. E. L. A. CONVENTION

Pasadena, preeminently beautiful among the cities of Southern California, has been selected as the place of holding the next convention of the National Electric Light Association. It will convene at Hotel Huntington on May 18th, 1920, and continue in session including May 21st. The selection of the convention city was made by the executive committee of the national organization at headquarters, 29 West Thirty-ninth Street, New York City, and was announced by President R. H. Ballard on the evening of October 7th. Data thus far collected by the executive committee indicates that at least two thousand delegates will attend the convention, going to California by special trains.

Los Angeles, Santa Barbara, Riverside, and San Diego each sent invitations to the executive committee requesting the honor of holding the convention. The invitations from Pasadena took the form of telegrams to the executive committee from all of its civic bodies.

The choice fell to Pasadena, because of its superior hotel accommodations; the fact that it is only nine miles from Los Angeles, the metropolis of the Southwest; and because the Hotel Huntington, beautifully situated in the San Gabriel Valley, can provide quiet and restful hospitality for those who attend the convention.

The executive committee is in receipt of telegraphic advices from Pasadena that the Maryland and Green, both large tourist hotels, will reserve sufficient rooms to accommodate the overflow of visitors who cannot be cared for at Hotel Huntington.

Pasadena, known as the crown city of the San Gabriel Valley, is world-famed as a summer and winter tourist resort, and the home of many millionaires, authors, artists, and celebrated people. It lies almost directly beneath Mt. Wilson, and the mountains of the Sierra Madre range form a crescent to the north. In every direction the wonderful automobile roads for which Southern California is renowned lead out through labyrinths of orange groves, and down to the Pacific and a dozen seaside resorts.

President Ballard has received wire advices from Los Angeles, California, his home city, that the civic bodies of

Pasadena and the several large electric corporations which operate in the Southwest will cooperate with the committees of the organization in providing entertainment to the tourists and their families, which will make their visit to Southern California an event of unprecedented pleasure.

ELECTRICAL SUPPLY JOBBERS' ASSOCIATION

The date of the Pacific Coast meeting of the Electrical Supply Jobbers' Association at Del Monte has been changed from Nov. 13, 14 and 15 to December 4, 5 and 6. The change has been made on account of the general meeting to be held on Nov. 18, 19 and 20 at Cleveland, at which it is felt there should be a large Pacific Coast delegation present to urge the desirability of holding the Jobbers' convention next May in California. It is hoped that the change in the dates of the Pacific Coast meeting will enable a large Western delegation to go to Cleveland.

INSTITUTE OF RADIO ENGINEERS

BY D. I. CONE

A paper by E. T. W. Alexanderson on "Transatlantic Radio Communication" was presented by Prof. Harris J. Ryan to the San Francisco section of the Institute of Radio Engineers at its meeting of Oct. 17, held at the Engineers' Club. There was a large attendance and much discussion. Officers for the section were elected, as follows: Chairman, W. W. Hanscom (incumbent); secretary-treasurer, Major J. F. Dillon; member of executive committee, Prof. A. Press.

The paper presented, which appears in the October Proceedings, A. I. E. E., and the November Proceedings, I. R. E., describes the present situation relative to high-power radio communication, and indicates ways of enormously expanding the message-carrying capacity, by (1) greater speed of sending; (2) increased selectivity, permitting less differences of wave-length between stations; (3) directional transmission. The Alexanderson high-frequency generator, its speed-control, the magnetic amplifier, and the new multiple antenna, are described in considerable detail.

Prof. Press described theoretical studies of a very efficient antenna, to which the multiple antenna approximates. A general discussion of directional transmission was con-

cerned largely with observations of airplane antenna performance.

The November meeting will have for its subject a paper on "Vacuum Tubes," by O. B. Moorhead.

FOREIGN TRADE CONGRESS

The seventh annual Foreign Trade Congress is to be held in San Francisco from May 12th to May 15th, 1920. "Problems of the Pacific" is the special theme of the convention, but there will be discussions on practically every phase of the overseas commerce of the United States. The gathering will be large and representative, including leading American business men resident not only in the United States but in foreign lands as well. Special steamships have been chartered to bring delegates from the Far East, and from the west coast of Africa—one liner starting from Calcutta and another from Valparaiso. A special ship will also go from New York to San Francisco by way of the Panama Canal, and several special trains bearing delegates will cross the continent by different routes.

All these preparations to facilitate attendance, and the widespread interest manifested in the Congress, assure a successful meeting of such magnitude as the last Foreign Trade Convention, at Chicago. Attendance is by invitation only, but any reliable American business man can readily procure an invitation. The Congress is under the auspices of the National Foreign Trade Council, which includes many of the most influential commercial and industrial leaders in the country. James A. Farrell, president of the United States Steel Corporation, is president of the council, and the treasurer is R. H. Patchin, manager of the Foreign Trade department, W. R. Grace & Co. O. K. Davis, New York City, serves as secretary of the Foreign Trade Council.

While San Francisco will be host of the convention, all the Pacific Coast cities are counted on to help entertain the delegates in characteristic fashion; and there will be an excursion to Honolulu, Hawaiian Islands. Without question, the Pan-Pacific area will gain much permanent benefit through the holding of the Foreign Trade Convention in San Francisco, 1920.

HAPPENINGS IN THE INDUSTRY

FREE INSURANCE FOR EMPLOYEES

The San Joaquin Light & Power Corporation on October 15th put into effect an insurance plan for the benefit of its employees. Every person who has been in the employ of the company, or any of its subsidiary companies, for more than ninety days of continuous service, will automatically share in the benefits. The subsidiary companies include the Fresno City Water Company, the Midland Counties Public Service Corporation, Bakersfield and Kern Electric Railway, and several gas and water companies in the smaller towns throughout the territory. The amount of the insurance to be placed to the credit of the employee is governed by length of his or her service with the company. The minimum amount is \$1000 and the maximum \$1500, graduated as follows:

During first year service, \$1,000 insurance.
During second year service, \$1,100 insurance.
During third year service, \$1,200 insurance.
During fourth year service, \$1,300 insurance.
During fifth year service, \$1,400 insurance.
During sixth year service and over, \$1,500 insurance.

The insurance will be carried by the company without any cost or obligation whatsoever upon the part of the employee. All that he or she will be required to do is the signing of a formal application for insurance, naming beneficiary in the case of death. All employees in all departments will be

given credit for the length of service they have given the company to date.

A. G. Wishon, general manager of the San Joaquin Light & Power Corporation and subsidiary companies, in announcing the insurance plan, made public the decision of the directors to grant two of the highest class policies to the beneficiaries of two old-time employees, who have recently died, out of regard for their long terms of faithful and loyal service. These employees are Charles L. Easton, former electrical superintendent of the Midland Counties Public Service Corporation, who has been in the employ of the company for twenty-one years and whose death occurred in Santa Maria Sunday, October 5; and J. H. Newlin, for fifteen years past superintendent of the Fresno City Water Company and purchasing agent of the San Joaquin Light & Power Corporation and subsidiaries. Mr. Newlin died at his home in Fresno October 13.

As an idea of the wide effect the insurance will have in the ranks of the Power Company employees, it is only necessary to state that at the present time there are more than one thousand names on the pay rolls of persons—men and women—entitled to the benefit. Of this number 112 will automatically go into the highest class, having been in the employ of the company for six years or more.

NEW EXPRESS PACKING RULES

Preparations are being made to put the new express packing rules into effect on December 10th, the date authorized by the United States Railroad Administration, which recently approved the new requirements.

The new rules were put into effect to induce shippers to turn their business over to the carrier so that it can, with reasonable care on the part of the express company, be handled properly. The rules will not permit the use of paper wrapping for packages over 25 pounds, nor of ordinary paper boxes, wrapped or unwrapped, when the weight of the contents is over that limit. For shipments over 25 pounds, wooden containers, or fibreboard, pulpboard, or corrugated strawboard containers of specified test strengths, are required.

This standardization of express rules will place the express service on the same basis as freight, so far as the character of the cartons used is concerned. Express traffic supervisors are of the opinion that the stronger containers required will very perceptibly help to improve the express service and to protect the miscellaneous commodities shipped by express from damage or interference enroute. It is calculated that the time remaining before December 10th will be sufficient to enable express shippers to adjust themselves to the new packing requirements.

COOPERATIVE ADVERTISING

Enclosed with a copy of the newspaper advertisements for October, prepared by the California Electrical Cooperative Campaign for use by the central stations, is the following message to the retailer:

The sole purpose of these advertisements is to interest the public in the appliances you sell. These advertisements are business builders and of vital importance to your success.

The Advisory Committee recommends that you call on the central station manager in your city and let him know that you are interested in these advertisements. He will be more inclined to use them if he knows that the dealer interested is appreciative.

You should tie-in with these advertisements if you expect to secure the benefits of them and direct this building force to your own business. That is, you should run an advertisement of your own, calling attention to the place where electrical appliances can be purchased (your store), and state definitely the electrical appliances the public can purchase from you (your stock).

Your jobber and manufacturer have advertisements that will do this for you. Call on them to furnish you with this service that is your due.

STREET RAILWAY TAXES

Thirty days delay in consummating the purchase of the street railway lines by the city of Seattle will cost the taxpayers the sum of \$300,000, unless the supreme court of the state shall rule that the taxes can be remitted, as the car lines are now the property of the city. Property for assessment purposes is valued as to its ownership at noon March 1 of each year. The car line transfer was made on April 1. The total taxes levied this year against the street car lines, formerly the property of the Puget Sound Traction Light & Power Company, will be slightly more than \$400,000. The additional \$100,000 will be paid by the electric company according to an agreement signed with city officials when the sale was made, providing for pro-rating the taxes if any were levied.

RED CROSS CHRISTMAS SEALS

The National Tuberculosis Association will conduct its annual sale of Red Cross Christmas Seals from December 1st to December 10th. The proceeds of the sale go to combat the spread of tuberculosis.

COMPANY PLANS CAPITAL INCREASE

At a special meeting of the stockholders of the Hurley Machine Company, held at the company's offices in Chicago, October 2nd, it was voted to change the capitalization in so far as the common stock was concerned from 15,000 shares of a par value of \$100 to 200,000 shares of no par value. This new stock will be exchanged on the basis of seven shares for one of the old common stock. An increase in the membership of the board of directors from five to nine was also authorized.

The old common stock paid 8% per annum in dividends and the offering of new stock will be made to stockholders of record October 15th. The plan to change the capitalization has been responsible for an advance in the common stock on the local curb from a little over par to 208 in the past few weeks. The rate of earning of the new stock has not been decided upon.

The preferred stock was not changed and remains the same, namely, 5000 shares of a par value of \$100. This stock brings dividends at the rate of 7% per annum. It will eventually be retired through a cumulative sinking fund of 3% of the outstanding issue for each year beginning next January and also 15% of the net earning applicable to the common stock beginning January 1, 1918.

An offering to the common stockholders of record October 15th, of 10,000 shares of the new common stock at \$35 per share was also authorized. The proceeds from the share of this stock is to be used in the extension of the company's plant facilities. The demand for the company's products, which includes the well-known Thor line of electric washers, ironing machines and vacuum cleaners, has grown rapidly in the past few years and has necessitated the building of large additions to its present plant.

The new board of directors will consist of the following:

Edward N. Hurley, chairman.
Neil C. Hurley, president of the Hurley Machine Co.
Samuel Felton, president of the Chicago Great Western Railway.
John Burnham, John Burnham & Co.
Edward F. Carey, president of the Haskell Barker Car Co.
Joseph E. Otis, vice-president of the Central Trust Co. of Illinois.
Silas Strawn, Winston, Strawn & Shaw.
Alva J. Fisher, vice-president of Hurley Machine Co.
Edward N. Hurley, Jr., president of the Hurley Supply Co.

JAPANESE TURBINE INSTALLATION

Two 25,000-kw. steam-driven turbine units of Westinghouse make, which, when installed, will complete the largest steam-driven electrical installation in the Far East, are now being erected at Osaka, Japan, for the Osaka Electric Light Company.

Located in an extensive industrial district, this company furnishes light and power to street railways, steel works, ship builders, copper refining plants, paper mills, electrochemical installations and other industries.

It is noteworthy that in 1908 the Osaka Company installed three steam turbine units of 3,000 kw. each. In 1910 two more units of like capacity were added, and in 1911 two 5,000-kw. units. The 25,000-kw. units now being installed will bring the capacity of this plant up to 100,000 hp. All of the above units are of Westinghouse manufacture.

NEW HYDROELECTRIC DEVELOPMENTS IN JAPAN

The shortage of motive power in large cities in Japan has called forth numerous water power projects. The present situation resembles closely that which existed at the close of the Russo-Japanese war except that in the latter case the main stress was laid upon electric lighting while the recent tendency is toward electric power. The following are some recent additions to the list of projects:

The Kanto Hydroelectric Company is being planned, to develop a power of 168,000 hp., by harnessing the River Tone and its branches. The total capital needed is estimated at \$8,500,000. The power developed will be transmitted to and sold in Tokyo.

The Nippon Water Power Company is being organized with a capital stock of \$22,000,000, by the Osaka Electric Company, the Kyoto Electric Light Company and the Hoku-riku Electro-Metallurgy Company interests. The purpose is to develop power for transmission to Osaka, Kyoto and vicinity.

STANDARDIZATION AS AN AID TO WORLD PEACE

At the dinner given in honor of Mr. Charles LeMaistre, secretary of the British Engineering Standards Association, by the American Engineering Standards Committee, the guest

of the evening expressed the opinion that one of the strongest ties which can bind two or more nations together is engineering and industrial standardization.

Mr. LeMaistre said, in part:

"Standardization means efficient production. It can only be effective when overlapping is avoided. Overlapping can only be obviated by the operation of some central organization, which we have provided in Great Britain with wonderful effect. We find now that overlapping of effort is becoming less and less each year and the British Engineering Standards Association is becoming more and more recognized as the central authority for drawing up standards for the engineering and allied industries.

"My Association feels that, at the present important stage of the development of the work and of the closer relationship with the United States, if only we could get coordination of standardization on both sides of the water, one central authority on each side, it would not only help our industries enormously, but we could work hand in hand on these technical problems which involve this complicated human factor. And in doing this big work we would surely be no mean influence in promoting the peace of the world."

SHIPS FOR THE PACIFIC

A tentative program of allocation of ships for Pacific trade has been announced as follows:

- 15 ships (weekly sailings) San Francisco to Japan, China and Philippines.
- 2 ships San Francisco to Vladivostok, Manchuria, China and Japan.
- 2 ships San Francisco to India and Dutch East Indies.
- 2 ships San Francisco to Tahiti, Tonga, Apia and Honolulu.
- 4 ships Los Angeles to Japan, China and Philippines (weekly sailings).
- 4 ships (weekly sailings) Portland to Japan, China and Philippines.
- 14 ships Seattle to Siberia, Manchuria, Japan, China and Philippines.
- 10 ships from general Pacific Coast ports to Europe.
- 4 ships from general Pacific Coast ports to Australia and New Zealand.
- 3 ships from general Pacific Coast ports to West Coast of Mexico, Central America and South America.
- 3 ships from general Pacific Coast ports to West Indies, Venezuela and Colombia.

In addition to the foregoing allocation to regular trade routes there will be fifteen ships which would be known as seasonable or tramp ships. They will be placed in service from Pacific Coast ports to China, India and Australia and will call at any Coast ports if the amount of trade will insure a sufficient cargo.

COURSES IN FOREIGN TRADE

The College of Overseas Commerce, Flood Building, San Francisco, has recently announced a course of training for overseas commerce, beginning on October 20th last and continuing for two months. The course is under the direction of A. E. Paulson, S. N. Smiley, Geo. W. Fishback and John J. Seid, and will cover the following subjects: Processes and Documents in Export Transactions; Commerce with the Orient, and Marine Insurance; The Operations of Foreign Exchange; Commercial Relations with Latin America.

VISIT OF SWISS MISSION TO ELECTRICAL PLANTS

The Westinghouse plants at East Pittsburgh and Wilmerding were recently honored by a visit from the Swiss Mission for economic studies in North America.

This mission is visiting various cities in the United States and Canada, for the purpose of studying American methods and practices.

Following the reception at Wilmerding a trip was taken through the Airbrake Works, where the various processes involved in the manufacture of the airbrake were explained in detail to the visitors, who expressed much interest in the manufacturing methods pursued by the company. Later the party were shown through the electric and machine works constituting the East Pittsburgh plant.

INDUSTRIAL GROWTH IN AUSTRALIA

Australian industries have expanded during the last three years, judging from the amounts of new capital issues authorized in that commonwealth. The issues total \$368,400,000, divided as follows:

Manufactures and production.....	\$172,700,000
Trade and finance	87,000,000
Mining	48,900,000
Public utilities	22,100,000
Other capital issues	36,700,000

Of these authorizations \$194,800,000 were granted to new companies, and \$173,600,000 to existing companies.

JAPANESE TRADE WITH NEW ZEALAND

Japan's imports into New Zealand are increasing rapidly, and they consist almost entirely of manufactured goods. During the war period large quantities of Japanese goods flooded this market. The increased trade between Japan and New Zealand for the last six years is shown by the following table:

Year	Exports to Japan	Imports from Japan	Year	Exports to Japan	Imports from Japan
1913.....	\$ 14,166	\$ 735,357	1916.....	\$535,533	\$2,739,712
1914.....	239,594	912,472	1917.....	21,353	3,060,162
1915.....	668,968	1,480,982	1918.....	26,351	5,912,140

It will be noticed that the exports to Japan have fallen off greatly during the past two years, owing to the fact that wool, the principal export to that country, was commandeered by the British Government.

The chief lines of export to New Zealand for 1917 included electrical insulated cable and wire, the value of the exported material amounting to \$48,998.

RAILWAY ELECTRIFICATION IN NORWAY

The first definite step to be taken in the plan for the electrification of the entire railway system of Norway is the acceptance of bids by the Norwegian Government for the electrification of the railway from Christiana to Diammen. The bids include 18 normal gage locomotives, to be built in Christiana. Power is to be obtained from the Hakavik power station, which can produce about 25,000 horsepower.

WATER POWER IN CANADA

A comprehensive report recently published by the Water Power Committee of the Joint Board of Scientific Societies, in London, England, shows that Canada possesses more than one-quarter of the entire water power capacity of the whole British Empire. It is pointed out that for the Empire to recover with any degree of rapidity from financial burdens resulting from the war, it will be necessary to develop its latent resources to a much greater degree than ever before. For this, an ample supply of cheap energy must be made available. Because of the cheap water power in Canada, it is expected that many of the large British manufacturers will move their plants to that country. Many new enterprises, backed by British capital, are also looked for.

DEVELOPMENT ON WINNIPEG RIVER

A huge power plant is being constructed at Du Bonnet Falls, on the Winnipeg River, 75 miles north of the city of Winnipeg. This will be the greatest link in the chain of power sites on the river, which is expected to supply eventually a total horsepower in excess of half a million. The entire course of the Winnipeg River lies within 100 miles of the metropolis of Manitoba.

The huge Du Bonnet Falls project is being developed by the Winnipeg River Power Company, closely allied with the McKenzie-Mann interests and the Winnipeg Electric Railway Company. It will have an ultimate capacity of about 168,000 hp., and is being constructed in six units of 28,000 hp. each. When completed, the cost of the whole project will be between \$6,000,000 and \$7,000,000. Engineers declare that the capacity of the new plant will exceed the combined power output of the City of Winnipeg's plant at Point du Bois and that of the Railway Company at Pinewa Channel.

A special extra section devoted to news of the Pan-Pacific field will be found under "New Electrical Developments" in this issue.

ELECTRICITY IN IDAHO

The Idaho Public Utilities Commission, October 11, rendered a decision in the somewhat celebrated electric heating case, wherein it was said not to be feasible to heat by electricity in Idaho, and that it would be unwise to hold out to residents that this could be done.

Every hydro-electric power company in the state was cited to appear and give evidence in this case nearly a year ago. A month was occupied in taking the evidence. Since then the commission has had it under consideration.

The claim was made that heating homes and office buildings in Idaho by electricity was practical. The Commission holds it is not. The decision is the first of its kind rendered in the United States.

TRADE NOTES

New Business —

Under the firm name of Regalia and Behan, Fred Regalia and Richard F. Behan have opened a large new automobile repair shop at 1774 Mission Street, San Francisco.

Firms Merged —

The Electric Agencies Company, Inc., of California, with offices in San Francisco, Los Angeles and Seattle, has been absorbed by the Allied Industries, Inc., of California. The new arrangement was made for the purpose of broadening the scope of old company's activities, to provide better facilities for handling business and give for the company's and the client's mutual benefit the best possible representation of the manufacturer.

B. A. Wagner, of the Electric Agencies Company, W. S. Greenfield, former manager of the H. W. Johns-Manville Company of California, M. H. Klinger, F. G. Van Booskirk and C. D. Slaughter, formerly with the same company, will be the directing heads of the new firm. R. Wolfsberg continues in charge at 340 Azusa Street, Los Angeles, and R. C. Shipman at 1252 First Avenue South, Seattle, Wash.

Two New Offices Opened —

The Mechanical Appliance Company, makers of Watson Electric Motors, with factory and main offices at Milwaukee, Wis., have recently opened up new offices in Buffalo and St. Louis.

W. C. Winterroth, formerly connected with their Chicago office, will be located at 318 Prudential Building, Buffalo, as district sales manager for Western New York.

The St. Louis office will be in charge of L. F. Mahler, who has recently been appointed district sales agent for St. Louis and adjacent territory. His office is located at 1039 Syndicate Trust Bldg., St. Louis.

Change in Company —

F. C. Green has retired from the firm of E. L. Knight & Company, Portland, Ore., and has sold his interest in the business and good-will to E. L. Knight who will continue the same at the old location, 449 Washington Street, under the former firm name. Mr. Knight has assumed all the liabilities of the old firm.

THE PELTON WATER WHEEL

A Letter to the Editor

Editor Journal of Electricity:

In your issue of Sept. 15th Mr. Chas. H. Tallant discusses the origin of the Pelton water wheel and says (p. 265) that it was invented by Lester A. Pelton "in the late 'seventies." A little farther on he says, "Pelton made a trip to the State University at Berkeley, where he arranged with Professor Hesse, professor of mechanical engineering, to design and build an impulse wheel in accordance with his own discoveries. * * *

I do not desire to question the above statements, but as an old U. C. man, and in justice to the memory of the late Professor Hesse, I would like to have it known that he de-

signed a divided bucket wheel about ten years before the time mentioned by Mr. Tallant. In proof of this statement I wish to quote from a pamphlet by Mr. Pelton himself on the "Origin of the Pelton Water Wheel, with a statement by F. G. Hesse, Professor of Mechanical Engineering, University of California" (J. W. McCombs, Printer, 426 Ninth St., Oakland, Cal., May, 1887).

Quoting parts of Prof. Hesse's letter: "At some time between 1865 and 1868, Joseph Moore, then superintendent of the Vulcan Iron Works, San Francisco, asked my opinion of the best water wheel. * * * I furnished drawings for such a bucket (diagram showed the now well-known divided bucket). * * * I never contemplated taking out a patent * * * Since meeting you I believe your statement that you had no knowledge of what I had done in this field. Yours very truly, F. G. Hesse."

Very respectfully,

A. L. JORDAN.

"LUMEN" AND "CANDLE POWER"

A Letter to the Editor

I have followed with considerable interest the series of articles entitled "Practical Lessons in Electricity" by H. H. Bliss, which forms a basis for correspondence courses in elementary electricity offered by the Extension Divisions of the Universities of California and Oregon. In reading the last lesson in the Journal of Electricity for October 1, 1919, I note that the author in discussing candle power refers to spherical candle power and from that develops the total quantity of light given out by a lamp and refers to this quantity as units, without specifying any names for the units.

The Illuminating Engineering Society has for some time been endeavoring to have lamps rated on a more rational basis than that of horizontal candle power. This unit is not a true measure of the quantity of light obtained from a lamp because of the fact that the light is not emitted at the same intensity in all directions. The use of the term "mean spherical candle power" is somewhat of an improvement but this is only a hypothetical unit. There is, however, a unit which is used to indicate the total output or flux of light from any light source. This unit is called the "lumen." Lamps are now being rated in lumens instead of candle power and eventually the term "candle power" is certain to disappear and the term "lumen" will be used exclusively for the comparison of the illuminating value of various light sources, as well as for the determination of illumination problems. The sooner the public is educated to use the term "lumen" instead of "candle power," the sooner will this condition be brought about. In the lesson referred to, the use of this unit in the determination of illumination is shown and it would seem that to give a definite name to the numerical value would make the meaning simpler to the beginner as well as be of great assistance educationally by familiarizing the beginner with the use of the correct term.

This is an educational opportunity too great to be overlooked and I believe should be brought to the attention of the editor of these lessons, as undoubtedly it was an oversight on his part in not including the name of the unit instead of leaving the values with no particular identification mark. In other words, if he would simply change the term "unit" in the 2nd, 3rd and 4th paragraphs from the end of his article on page 315 to "lumen," he would be accomplishing much more than he is at the present time and would make his explanation fully as clear. The term "lumen" will be just as easily understood in a short time as the term "candle power" and is certainly a great deal more rational.

Very truly yours,

F. H. MURPHY,

Illuminating Engineer,
Portland Railway Light & Power Company.



Display of dealers' helps and window trim material which formed the background of a lamp selling demonstration at the recent Edison Lamp Agents' Conference

LAMP DEALERS' CONFERENCE

The problem of how best to sell lamps was considered from all angles at the recent conference of Edison Lamp Agents, held on October 10th at the Palace Hotel, San Francisco. The meeting was in charge of F. D. Fagan, district sales manager of the Edison Lamp Works at Oakland, Cal., and was attended by about seventy-five dealers and representatives from the General Electric Company and the Pacific States Electric Company.

E. O. Shreve, San Francisco manager of the General Electric Company, made a brief introductory address and then turned the meeting over to Mr. Fagan, who pointed out the importance of lamp sales as a forerunner for other business and discussed many of the practical problems of keeping an adequate stock which shall still be live throughout.

D. E. Harris, vice-president of the Pacific States Electric Company, pointed out that with the new estimate of customers' buying ability, dealers may count on a possibility of \$500 to every home, or an average of \$100 per person. He further emphasized the importance of lamp merchandising as the one feature which ties a business together. The customer who has received satisfactory service from the lamps which have been furnished by the dealer will be open-minded on the subject of other electrical appliances, lamps and washing machines, for instance, being suggested as a good combination on which to specialize.

Reports were made by several dealers on methods which they had found effective in lamp merchandising. W. S. Hanbridge of the Hanbridge Electric Shop, San Francisco, emphasized the value of utilizing the dealers' helps sent out by the national manufacturer, particularly by slipping folders into all lamp packages before they are handed to the customer. Louis Levy of the Levy Electric Company reported briefly on the lamp campaign which he has been carrying on with the help of the school children of his neighborhood. A similar plan had been tried by one of the other companies and had in both instances proved most satisfactory, much interest being shown by parents and friends in the store for which their children had been working. M. L. Scobey of the Home Electrical, San Francisco, told of the excellent business which he had built up about lamp contracts with apartment houses and business establishments. He also pointed out the possibilities in national advertising of which the dealer is not yet taking full advantage. Several other dealers reported on

their successes in lamp selling as a factor in general store merchandising.

L. E. Voyer, illuminating engineer with the sales organization of the Edison Lamp Works, reported on the new lighting code for California. The code is now in process of being printed and will be put into effect some time in November.

A pleasant luncheon was served in the interval between the morning and afternoon sessions, during which T. E. Bibbins, president of the Pacific States Electric Company, spoke on the importance of loyalty in business relationships.

Several of the visitors at the conference were asked to speak a few words. George R. Purvis of the Hurley Machine Company told of the installation of the new Thor Shop in San Francisco. L. H. Newbert, in charge of the commercial department of the Pacific Gas & Electric Company, spoke on the California Electrical Cooperative Campaign and its plans for the immediate future. Robert Sibley, editor of the Journal of Electricity, pointed out the importance of the coming year to the electrical industry of the West and urged a united effort to reap its full benefits.

R. M. Alvord, local manager of the Supply Department of the General Electric Company, demonstrated the use of the new poster box covers for small supply material on the dealer's counter as well as in his window and showed three different types of window displays in which mazda lamps were tied in with other appliances or apparatus in the appeal to the public. He also pointed out the need for better merchandising in order that the public may eventually benefit from the reduced cost of distribution and not become discontented because the improvements so widely heralded were not passed on to them.

M. T. Dolman, manager of the sales promotion bureau of the Pacific States Electric Company, supplemented by D. E. Harris, explained the function of his company in tying in with the magazine advertising of the Edison Lamp Works, both in assisting the dealer with his advertising problem and in the following up of prospects.

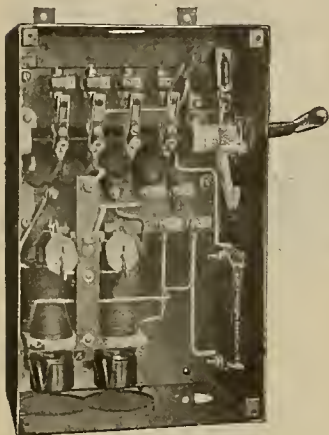
The afternoon's program was concluded by a most entertaining and instructive demonstration of how to sell lamps and how not to do it, staged by F. D. Fagan and H. H. Daley. Most valuable suggestions were brought out in the discussion which followed, both in regard to the more effective use of national advertising in the store and the emphasis upon the quality of the goods sold by the electrical dealer, which is his strongest argument for continued dealing with his store.

LATEST IN EVERYTHING ELECTRICAL

(For the motor which cannot be connected directly to the line without resulting in a dangerously large starting current, a special starter has been designed. Another type of squirrel cage motor starter recently put on the market, and a convenient combination electrical set for traveling are among the new apparatus here reported.—The Editor.)

POLYPHASE MOTOR STARTERS

The important features of two new squirrel cage motor starters now on the market include a time limit overload relay and a starting resistor for motor protection, and safety operating design. The starters, known as Bulletins 9117 and 9118, are manufactured by the Cutler-Hammer Manufacturing Company, Milwaukee, Wis.



Bulletin 9117 Starter with front cover removed showing contactors, duplex relay and low-voltage coil.

The Bulletin 9117 starter has, besides a low voltage release, a duplex time limit overload relay which is a complete unit in itself. The design of this overload movement is such that it does not open the circuit of the low-voltage coil on a high initial inrush of current nor on a momentary overload, but it will not permit a harmful overload to be maintained. This condition is obtained by retarding two moving plungers in oil dash pots. The plungers, which are actuated by two operating coils, trip a single contact making device, thus opening the motor circuit. At the same time the force of each plunger must overcome an adjustable weight which may be set at various positions along a lever arm, depending upon the amount of current desired to operate the plunger. By turning an adjusting screw the flow of oil around the plunger head may be regulated.

To start the motor, the operator moves the starter handle to the "up" position. This connects the motor to the line and brings into position an interlock which prevents opening the cover of the case. To stop, the operator simply moves the lever back to the stop position, which opens the circuit with a quick break and removes the interlocking bar. The starter is made with either three or four poles for use with standard squirrel cage motors from 3 to 15 hp., and with high torque motors of the "internal starter" type from $7\frac{1}{2}$ to 25 hp. where the line voltage does not exceed 550 volts.

The starter known as Bulletin 9118 is adapted for those motors which cannot be connected directly to the line without resulting in a dangerously large starting current. One step of resistance is provided in each of three phases during starting, allowing the motor 60% line voltage and an inrush of approximately three times full load current. By using another set of terminals the resistor is decreased to give approximately 75% line voltage, and $3\frac{1}{2}$ to 4 times normal current.



Lowering the panel of the Bulletin 9118 Starter deadens the fuses and makes them accessible for renewal. The switch cannot be closed while the panel is lowered.

The low-voltage protection coil automatically returns the switch to the "off" position upon failure of voltage.

The motor is started by raising the handle to the starting position, which closes the switch. The handle is held there until the motor has reached full speed. Releasing the handle causes the switch contacts to slide into the running contacts, without opening the motor circuit. The fuses are not in the motor circuit until the switch is in the running position. Therefore, they do not carry the large starting current, and need be of no greater capacity than proper protection demands. This starter is designed for starting standard polyphase squirrel cage motors of from 1 to 10 hp. on any commercial voltage not exceeding 550 volts. The starter can be furnished with resistors suitable for two-phase, four-wire circuits, in which case an additional knife switch is required to entirely disconnect the motor.

Both types of starters are completely enclosed and are so designed that it is impossible to touch any live parts, either while operating or while renewing fuses and making adjustments. Contact posts and figures are of standard C-H construction used in the heavy drum controller, easily inspected and renewed. The enclosing cases are arranged for conduit wiring.

UTILITY IRONING SET

Distributors of electric appliances will undoubtedly be interested in an attractive utility set put on the market by the Hotpoint division of the Edison Electric Appliance Company, Chicago, Ill.

It consists of a three-pound iron, folding curling iron, collapsible stand for inverting the iron while heating the curling iron or when using as a small cooking stove. Liberal cord and plug included. The iron differs only from the standard Hotpoint Iron in the following respects: It has no attached stand; has two holes in the rear for insertion of curling irons—thus two irons may be heated at the same time. When the stand supplied for inverting the iron is not used for that purpose, it serves as an ordinary iron stand. The set



Convenient set for traveling

fits into a very cleverly constructed folding box consisting of four wooden sides, hinged with cloth, constructed to fold up in such a way as to provide closed ends. When folded in the box form it presents a very compact, neat appearance. The size when folded is approximately 8 by 5 by 4.

The big feature about this box is that when unfolded it provides a very handy ironing board, surface 16 by 8 in., on which any little pressing job may be accomplished by the user. Thus the inconvenience usually experienced by travelers not having suitable ironing surface will be done away with.

Because the set occupies so little space in traveling bag, suitcase or trunk, it will without doubt meet with approval from travelers.

NEW ELECTRICAL DEVELOPMENTS

(The opening of several new industrial plants in the Northwest calls for extensive electrical installations; in the Pacific Central district various power plant extensions are under way and big pumping projects planned; in the Southwest and Intermountain districts new regions are opening up and demand a power supply. Electrical items from the Pan-Pacific area indicate the activity along this line which is characteristic of the after-the-war period.—The Editor.)

THE PACIFIC NORTHWEST

LAKE CITY, WASH.—Lake City has filed a petition for the purpose of extending a water main to this addition.

VANCOUVER, WASH.—The matter of providing the city with an up-to-date lighting system is being considered.

SEATTLE, WASH.—The Seattle Street Railway Employees' Association has been organized by E. H. Davy and M. P. Murray.

SEATTLE, WASH.—The Port of Seattle Commission has decided not to purchase at this time the \$90,000 gantry crane for which bids were opened some time ago.

ASTORIA, ORE.—The McCartney Electric Company of this place received the contract for electric wiring of sections 1, 5 and 6 of the Port warehouse at \$3,344.

YOUNG'S BAY, ORE.—The Pacific Power & Light Company has let contracts for the immediate building of a million-dollar power, light & gas plant on a 15-acre tract here.

ALBANY, ORE.—W. F. Burman, E. C. Cline and C. E. Bryant have incorporated the Electric Store of Albany with a capital stock of \$10,000, to handle and deal in everything electrical.

CHEHALIS, WASH.—The city commission has passed a resolution calling for the installation of new standard street lights, about 90 concrete poles with 400-candle power lights on the business streets.

EVERETT, WASH.—The Commercial Club is discussing a better lighting system for the city. It is planned to create an improvement district in the down town section for installing a cluster light system.

EVERETT, WASH.—On November 15th an election will be held by the voters of this city to decide whether or not they desire a municipal power plant and to ask for sufficient bond issue to cover the proposal.

CHEHALIS, WASH.—The city of Chehalis will install sixty boulevard, 400-watt lamp posts on Market street and the Pacific Highway, within a short time, the North Coast Power Company furnishing the energy.

MARSHFIELD, ORE.—The Mountain States Power Company has closed a contract for furnishing 200 hp. electric energy to the Western Lumber & Manufacturing Company, which plant expects to start double shift operations.

LITTELL, WASH.—The Snow Lumber & Shingle Company at Littell, Wash., has recently connected 290-hp. in motors to the North Coast Power Company system, driving planers and other wood-working machinery.

CHEHALIS, WASH.—The Chehalis Mill Co. has installed 75 hp. in motors to drive wood-working machinery and will install an additional 150 hp. in a short time. These motors are connected to the North Coast Power Company's system.

KELSO, WASH.—The North Coast Power Co. is raising its line voltage between its Kalama Station and Kelso, Washington, from 6600-volt to 22,500, and later it will be raised to 45,000 to conform to the voltages of the balance of the system.

SEATTLE, WASH.—A petition for disincorporation has been filed in the superior court by the Master Electric Company of Seattle. The petition sets forth that all outstanding obligations have been satisfied and a hearing on the petition is to be held December 22.

SEATTLE, WASH.—H. Bittman, structural engineer, Securities Building, has been authorized to prepare plans for the construction of a one-story masonry building with concrete floors and basement for the Eveready Electric Service Company at East Pine street and Nagle Place, at an estimated cost of about \$30,000.

TACOMA, WASH.—Construction of another building to house the distributing plant of the Tacoma Gas Company, destroyed in a recent explosion and fire, has been started. The foundation for a new compressor, larger than the one in use, has already been laid.

COWLITZ, WASH.—Reclamation District No. 5, Cowlitz county, Wash., has made application to the North Coast Power Company to furnish electric energy to drive 350-hp. in motors to pump water from 9,000 acres of Columbia River bottom lands near Woodland, Wash.

SPOKANE, WASH.—An estimate made by City Engineer E. B. Hussey to the city commissioners showed that it will cost Walla Walla \$500,000 to own a perfectly reliable water system. The proposed reservoir will cost \$375,630, including the engineering water shed or else the creation of a main pipe line a mile above Tiger Canyon will cost approximately \$91,963.

SPOKANE, WASH.—Electric operation of the 207 miles of the Milwaukee railroad between Othello and the coast will start about November 1, if necessary motors and substation equipment are delivered in time, it has been announced. The train crews now are being broken in to the work and are said to be enthusiastic over the performance of electric locomotives on this division.

SEATTLE, WASH.—The Rothert Process Steel Company, 622 Harriman street, is installing a two-ton capacity alloy furnace to make its own alloys, the same to be operated by electricity as are its other furnaces. The company is now turning out two to three tons per day of high speed steel and the output is to be steadily increased. Installation of a small rolling mill is under consideration.

SEATTLE, WASH.—Erection of a new steel plant at Seattle is to begin within the next six weeks. The officers of the Western Rolling Mill Corporation make this announcement. The size of the plant will be 700 by 60 feet. It will have three open hearth furnaces of 50 tons capacity each and two continuous furnaces. It is understood that the company will put in its own power plant and will install one experimental electric furnace. It is probable that Wellman-Seaver-Morgan Company of Cleveland, Ohio, will install the entire equipment. Warner & Porter, financial brokers of Seattle, are handling the financial end of the matter. Offices are maintained at 401-403 Pacific Building, Seattle.

ASTORIA, ORE.—Announcement has been made that extensive developments are to be made by the Crown-Willamette Paper Company of its holdings in the Youngs River Falls section of the Youngs River district, a few miles above Astoria. The development plans include the erection of a 60-foot dam in connection with a plan to electrically harness Youngs River falls. Power will be furnished for an electric plant which will be the center of a number of industries to be located in that vicinity. The company announces a proposal to erect a grinding and pulp mill with a capacity of 100 tons of paper pulp daily. The work of clearing the site for the dam has been completed.

THE PACIFIC CENTRAL DISTRICT

OLDALE, CAL.—A mass meeting of Oldale residents was held to consider plans for the organization of a water company, to be composed of the water users of the community.

VALLEJO, CAL.—Before the work on the extension of the Pacific Gas & Electric gas plant in Maryland street is completed, the company will spend many thousands of dollars on the project. The Glover property recently purchased will be cleared of the present buildings in the near future, and a huge gas container will be erected.

RIO VISTA, CAL.—Specifications are being made by the Great Western Power Company for the construction of five miles of line to supply the territory adjacent to the Elkhorn Slough side of the Holland Land Company's holding. The line will be constructed from the present pumping plant of Reclamation District 999, south to a point near the present ferry to Merritt Island.

SONORA, CAL.—The Groveland and Big Oak Flat section are planning an irrigation district. The proposition is to buy the Golden Rock ditch and water rights.

MERCED, CAL.—The board of supervisors has called an election for the Merced Irrigation District of 173,000 acres. The project is to cost about \$6,000,000.

WALNUT CREEK, CAL.—Bids for the construction of two culverts between Walnut Creek and Danville were received but the Board of Supervisors rejected all offers and authorized the county surveyor to start work at once.

VALLEJO, CAL.—Mare Island is to win a second radio station for this district. This was announced officially and it was stated that three huge towers will be erected on the beach on the western shores of Mare Island at a cost of approximately \$150,000.

CHICO, CAL.—Tentative boundaries were defined for a drainage district that is to embrace approximately 180,000 acres of land along Butte Creek at a meeting of representatives of land-owners held here. It is expected that the construction of the district will cost \$85,000.

OROVILLE, CAL.—The Board of Supervisors has set Thursday, November 6, as the election day for both Oroville, Wyandotte and the Honeut-Yuba irrigation districts. At this time the voters will have an opportunity of sounding their final opinions as to the foundation of the districts.

FRESNO, CAL.—Two districts which desire to become part of the Pine Flat Conservation district have filed their petitions for organization with the State Irrigation Board. The San Jose district containing 25,000 acres is one, and the Burroughs Irrigation District containing 40,000 acres is the other.

OAKLAND, CAL.—The Oakland, Antioch and Eastern Railway has obtained from the Commission authority to construct a highway grade crossing over the county road between Concord and Bay Point in connection with the track it is to build connecting its line with a branch of the Bay Point and Clayton railroad.

SAN FRANCISCO, CAL.—The Pacific Electric Manufacturing Company has been incorporated, to manufacture and sell electric switches, etc. The capital stock is \$50,000; 500 shares at \$100 each; amount subscribed, \$50,000. Subscribers: Joseph S. Thompson, 46 shares; James A. Thompson, 20 shares; Edward F. Sixtus, 20 shares.

WOODLAND, CAL.—The Pacific Gas & Electric Company plans to extend its gas mains in the residential section of Woodland to meet the demand for fuel and heat following the increasing population of the expanding residential section. A crew of men is now piping First street, preparatory to paving by Clark and Henery.

FRESNO, CAL.—W. P. Boone, member of the State Irrigation Commission, and connected with the Pine Flat project, has gone to San Francisco to complete arrangements with the owners of lands in the Mendota, San Jose and Burrel districts of Fresno county to secure their entrance into the super-district under the Pine Flat project.

CHICO, CAL.—Engineers are reported to be on the ground, making the preliminary surveys for placing a concrete dam on the middle Feather above Hartman Bar, and fluming the water for a considerable distance around the hillside. J. Miller, who had charge of the operations at Robinson mine near Granite Basin, is said to have financed the project.

RICHMOND, CAL.—The decision reached by the conference of merchants, the city council and Manager George N. Rooker of the Western States Gas & Electric Company to have electroliers installed in all the Richmond business section will result in one of the most necessary improvements of the year. Ornamental poles and brilliant lighting will do much to enhance the appearance of the business section.

MEADOW VALLEY, CAL.—Under supervision of H. J. Greenbower, extensive development work is being carried on at the Greenbower mine, near Mount Ararat. Twenty men are busy building a wagon road around the mountain and it is proposed to build a debris dam that will be 35 feet high and 280 feet in length, with a base thickness of 85 feet. A ditch and pipe line are also to be constructed.

RICHMOND, CAL.—Reported intention of the owners of the \$3,000,000 Winehaven plant to turn it into a great warehousing project is borne out by the fact that concrete wharves are now being constructed at the plant. The big buildings are on the city's outer deep water front, are connected with the Richmond Belt railroad and have their own electric switching system with a transformer house.

MADERA, CAL.—The preliminary work for the formation of the Madera Irrigation District is rapidly being carried to completion. The district will comprise some 370,000 acres of the plains land in Madera county, and most of the water is to be secured by damming the San Joaquin river at a point one mile west of Friant and storing the water in the bed of the river. The cost of the project will be approximately \$15,000,000.

SACRAMENTO, CAL.—State Engineer W. F. McClure has recommended the sale of a supplementary bond issue of \$140,000 to be used for the purpose of completing the Paradise Irrigation District in Butte county. The money thus raised by the sale of bonds will be used for the purpose of preventing waste of water now lost through some of the many ditches of the district. The building of extra flood gates and other work is also contemplated.

YUBA CITY, CAL.—A meeting of land owners was held recently at Horkey's Corners, nine miles west of Yuba City, for the purpose of forming a rice irrigation district. The rice growers plan to secure water for irrigation purposes from the Sutter-Butte Canal Company by way of the Live Oak drainage ditch. The growers plan to lay pipes to carry the waste water into the Sutter By-Pass during the summer months, and to install pumps for the purpose of running water during the winter.

SAN FRANCISCO, CAL.—A campaign is to be launched by the Board of Supervisors to "educate" the people of San Francisco to the point where they will readily accept another bond issue for the completion of the Hetch Hetchy water and power project. This became known at a meeting of the Board, when it was

freely confessed that the \$45,000,000 voted by the people in 1910 will be inadequate to complete the system. Supervisor Andrew J. Gallagher presented a resolution urging the Public Utilities Committee to employ motion pictures in the education of the public.

RIO VISTA, CAL.—Plans are practically completed for the erection of a power line by the Great Western Power Company to serve the town of Franklin, which lies about ten miles south of Sacramento. The main line tap and the distributing lines about the town will cover about 12 miles. The cost of construction will be about \$20,000. A 22,000-volt line will be built from Hood, through which the present main line passes, to the town, where a substation will be erected for the distribution of the current. It is estimated that the load available will be about 500 horsepower. Most of the power will be used for lighting, cooking and pumping.

MERCED, CAL.—Another grade in the long fight for the Merced irrigation district has been made in the form of official endorsement of the project by the State Engineer, whose report has been received by the board of supervisors. In addition to the favorable report on the Merced district, the engineer denied the feasibility of the smaller districts within the proposed Merced district. These five smaller projects are known as the Plainsburg, Bloss, Nairn, Winton and Atwater districts, and were alleged, at the time their formation was proposed, to be a move on the part of the opposition forces of the big district. It is expected now that the election for the formation of the Merced district will be held some time early in October.

VALLEJO, CAL.—Water shortages at Fairfield, Suisun, Benicia and this city will be cared for in the future through the purchase of supplies from the Government if the plan decided upon at a conference of representatives of those cities and Mare Island officers is carried out. Commander L. M. Cox, public works officer at Mare Island, does not favor the plan of bringing water from Gordon Valley, because of the limitations of any reserve. The plan proposed by him is to secure fresh water from the Sacramento river at a point above Rio Vista, pump it through a thirty-four-inch wooden stave pipe to the present Government station at Creston, and then bring it through the Vallejo pipe to this city. Water can also be furnished to the other towns concerned. The project is to cost \$2,000,000, and an appropriation from Congress will be requested.

THE PACIFIC SOUTHWEST

SAN DIEGO, CAL.—City Engineer Rhodes has begun work on figuring estimates for the Barrett Dam.

LANCASTER, CAL.—A contract has been awarded Mr. Gibson of this city for the installation of cement pipe for irrigation purposes. Work will be commenced immediately.

PHOENIX, ARIZ.—Sealed bids will be received for making improvements according to plans and specifications for the improvement of certain portions of the Salt River Valley Canal.

REDLANDS, CAL.—The Pacific Electric Railway will do considerable track work, alterations to car barns, etc., to make ready for the running of the big steel cars from Los Angeles, which will take place by Jan. 1st at the latest.

RIVERSIDE, CAL.—The Riverside Water Co. has purchased land at Indiana Avenue and Fillmore Street, where an equalizing basin will be installed, which will impound 2,000 inches of water for 24 hours and afford a uniform flow of water delivered to 2,000 acres. The dam will be constructed across the Arroyo at the junction of Indiana and Fillmore—400 ft. long and 25 ft. high.

WICKENBURG, ARIZ.—A new project to irrigate 20,000 acres of land has been reported favorably to the state engineer. The land is located west of Hot Springs Junction and the dam location for storage of Hassayampa surplus

waters is 20 miles above Wickenburg. The storage dam proposed is to be located on the site of the old Walnut Dam and is to be 163 ft. high and 675 ft. long. The reservoir will cover 1,400 acres.

THE INTER-MOUNTAIN DISTRICT

DELTA, UTAH.—The Deseret Power Company officials are negotiating with the Telluride Power Company for the purchase of the former company's plant and distribution system.

LOGAN, UTAH.—Work has been started on the White Way lighting district for this city. The work is being done by the Intermountain Electric Company of Salt Lake City, who were the lowest bidders.

LEVAN, UTAH.—This town is seriously considering the purchase of electric power from the town of Fountain Green, the surplus power being available on account of a recent addition to the Fountain Green plant.

BOISE, IDA.—Application of the Utah Power & Light Company to extend their service to the towns of Dayton, Clifton and Oxford, in Bannock and Franklin counties, was received recently by the Idaho Public Utilities Commission.

CARSON CITY, NEV.—P. A. Simon of Mina has made application to the state engineer for permission to use the water of East Walker river for the generation of electric power. It is planned to create 5000 horsepower by means of an impounding concrete and rock dam to cost approximately \$600,000.

MANHATTAN, NEV.—Arthur Cox, former district superintendent for the Nevada-California Power Company, but now contracting for that corporation, has been awarded the contract to construct the power line from Manhattan to Tybo for the use of the Louisiana Consolidated and other companies in that section. The amount of the contract is in the neighborhood of \$100,000.

KALISPELL, MONT.—There is a shortage of buildings for business and residential purposes. The Mountain States Power Company is being requested to make extensions in outlying territory and a number of electric ranges are being placed. The company is also receiving a large number of inquiries for power for irrigation purposes and recently closed two contracts for two such installations, totaling 55-hp. in motors. Four additional electric ranges have just been placed.

BOISE, IDA.—An irrigation congress of delegates from 12 Western states has been called by Governor D. W. Davis, to meet Friday and Saturday, Nov. 21 and 22, at Salt Lake City. The congress is expected to develop into an amalgamation of the Western states to promote the development of unused water resources and to present to Congress the West's peculiar irrigation needs in the way of national legislation. It is probable that each state will be represented by ten delegates.

CARSON CITY, NEV.—J. F. Shaughnessy, chairman of the Public Service Commission, has announced that the commission will immediately order the Reno Traction Company to provide its Reno-Sparks line with up-to-date equipment. The company will also be directed to improve the roadbed and maintain first-class service. The commission has decided that the Reno city lines are not under its control, and that it will be necessary to amend the franchise of the Reno Traction Company to permit improvement orders issued by the commission to be put into effect. The Reno city council will be so advised.

THE PAN-PACIFIC

CHANARAL, CHILE.—The Andes Copper Mining Company has a smelting plant under construction, and will build a power plant at Chanaral.

TOKYO, JAPAN.—An air postal service is to be inaugurated between Tokyo and Osaka. The Imperial Aviation Society, a semi-official organization for the promotion of aviation, and the

Department of Communications are to cooperate in maintaining this service.

LIMA, PERU.—According to recent advices, Lima is to have an amusement park similar to Luna Park, New York. Extensive electrical illumination is planned, and there will be many modern amusement devices.

SYDNEY, AUSTRALIA.—Consul General J. J. Brittain of Sydney reports that the farmers in New South Wales are endeavoring to make use of the most up-to-date machinery on their lands, American machinery being much in evidence.

FUKUOKA, JAPAN.—The Nippon Electrical Sheet Iron Company, incorporated some months ago with a capital stock of \$1,000,000, is the first firm in the country to be engaged in the manufacture of electrical sheet iron.

AICHI, JAPAN.—The central part of Japan, comprising Aichi, Gifu, Nagano, Toyama, Ishikawa, Fukui, and two other prefectures, is the main district for the origination of hydroelectric power, and numerous companies have applied for the privilege of utilizing the swift flowing rivers in this part of Japan.

CELEBES, DUTCH EAST INDIES.—Some time ago reports were received relating the discovery of large iron ore deposits in Celebes, Dutch East Indies. These reports have been confirmed by government investigations, and the working of the fields is to be done by electricity if sufficient water power is available.

TIENTSIN, CHINA.—The China Mongolia Export Company, Inc., Tientsin, an American concern, has recently commenced work on a new cold storage, meat packing, and egg albumen plant. The machinery to be installed in the new plant includes one steam turbine with one 50-kilowatt electric generator.

MEXICO CITY, MEXICO.—The company operating the electric railway system of Mexico City and suburbs has made a contract for the completion of the line connecting the capital with the City of Puebla. Owing to the difficult nature of the country to be traversed it is not expected that the work will be completed until 1926.

HARBIN, CHINA.—The Chinese Eastern Railway is shortly to establish an automatic telephone exchange of 3,000 instruments here, the equipment having for some time been ordered and an expert engineer engaged to install the system. In this connection it is noted that Manila's new automatic system will be in operation soon.

IGUAZU, ARGENTINA.—The hydroelectric development of the great falls of Iguazu is to be undertaken. The Argentina Government has arranged for preliminary surveys to be made this year by a commission especially appointed for this purpose. The falls are very large and should prove a factor in the industrial growth of the country.

SHANGHAI, CHINA.—The Shanghai Tramways Co. (British) has decided to build its own tramway cars. The company has acquired land, on which it will build a factory. Orders for the machinery have not as yet been placed. The company proposes to begin with the construction of 15 cars, and seven cars for use in connection with its railless operations.

TAIHOKU, TAIWAN.—The first general meeting of the Taiwan Electric Power Co. (Ltd.) was held in Taihoku, Taiwan, recently, when the corporation elected its officers. Work on this company's plant, which is to be located at Lake Candidius, is to begin at once, and all inquiries regarding the possibility of furnishing materials should be addressed direct to the company at Taihoku, Taiwan.

GOOCHOW, CHINA.—There was recently formed in Foochow, China, an association for the promotion of Chinese industrial interests. Several members of this organization have already raised \$75,000 for the establishment of an iron foundry at Foochow. It is planned to produce small iron household, agricultural and other utensils, machine parts and other iron products of a simple nature.

GATUN, PANAMA.—The installation of lighting in the new cold storage plant at Mount Hope has been carried to 98 per cent completion. Fifteen motors have been placed in service. Work has been continued on the power plant equipment at Coco Solo, and the exterior electrical work on the seaplane hangar was 95 per cent complete at the end of July.

SHANGHAI, CHINA.—The agitation in favor of Chinese made goods is producing a great demand for cotton goods and a number of the principal mills in the vicinity of Shanghai, Tientsin and other centers are greatly increasing their output. Electrical machinery and other modern equipment is being installed and it is reported that American firms are receiving a goodly share of this new business.

TAMPA, MEXICO.—The National Norwegian Company has secured a concession from the Mexican Government for the construction of an electric railway line connecting Tampico and Tuxpan and with branches to various important places in that section. It is said that the new line will be inaugurated the first of the coming year and will provide transportation facilities for a region which has been neglected in the past.

TOKYO, JAPAN.—While before the war the commerce between Japan and the Argentine Republic hardly reached \$250,000 annually, last year it exceeded \$15,000,000. It is said that the recently created Japanese Legation in Buenos Aires is doing much to arouse interest in commercial circles in the merchandise of Japan and also to provide a market in Japan for such Argentine products as can be disposed of there to advantage.

BUENOS AIRES, ARGENTINA.—Buenos Aires is to have one of the largest wireless stations in the world, if present plans materialize. The Marconi Company has commenced work on a station which is to have a radius of several thousand miles. The company is planning to transmit commercial messages between New York and Buenos Aires. Another company is considering the construction of wireless stations to unite Argentina and Spain.

SHANGHAI, CHINA.—There has been formed in Shanghai a new chamber of commerce which, upon its organization, enrolled 2,700 Chinese firms, and to this list it expects to add 10,000 more members. While these organizations, which are composed of small retail firms, give the impression of being unions of shop keepers rather than chambers of commerce in the western sense, their influence on political and commercial life is nevertheless likely to be very great.

TOKYO, JAPAN.—The street railway department of Tokyo has decided to raise the wages of conductors and motormen and other workingmen. The decision was approved by the mayor and the raise was effective August 1st. The raise was made to meet the advanced cost of living. Five thousand six hundred conductors and motormen will have their wages raised by sixty per cent, and other workingmen numbering two thousand nine hundred by from sixty to a hundred per cent.

BATAVIA, JAVA.—An engineering congress composed of engineers in countries on the Pacific and Indian oceans will be held here in May, 1920, for the purpose of stimulating the technical development of eastern Asia. It is also hoped that the congress will result in the improvement and extension of trade routes in the east. Among various subjects to be discussed are harbors, communications, town planning, architecture and industries. The Dutch and English languages will both be used.

MELBOURNE, AUSTRALIA.—A modern plant is to be erected in the harbor of Melbourne for the handling of coal, which is to replace the present primitive method of hand-filled baskets, which are hoisted out of the steamers' holds by winches. The plant when completed will consist of four electrical hoists with grab buckets, which pick up four or five tons of coal at a time and deliver it to mechanically-operated

conveyers, which in turn carry it to great storage bins of 30,000-tons capacity, from which the coal is sent in chutes to coal trucks.

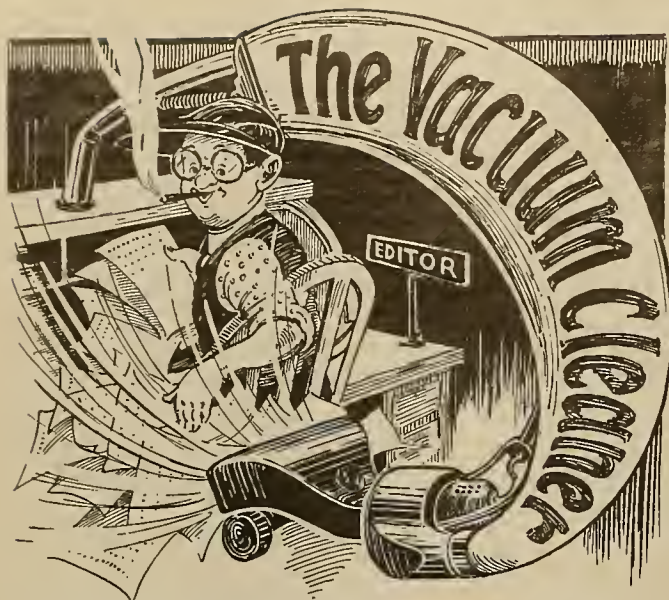
SYDNEY, AUSTRALIA.—The following comparative figures showing the increase in the business of the city council's electricity department between May, 1914, and May, 1919, were recently submitted to the council: On May 31, 1914, number of consumers, 10,280; 1919, 28,330; increase, 19,540, or 180 per cent; the units sold, 1914, 3,331,686; 1919, 6,993,534; increase, 3,661,848, or 110 per cent; the average price received for all units sold in 1914 was 1.88d.; 1918, 1.72d., a decrease of 0.16d.

SHANGHAI, CHINA.—The British Marconi interests and the Chinese Government have perfected a cooperative undertaking for the development of wireless communications in the Far East known as the "Chinese National Wireless Company." The capital is fixed at approximately \$3,500,000, one million being paid up. The Chinese Government owns one-half of the 700,000 shares, at the end of twenty years being privileged to sell to the Marconi interests or buy the latter out. The new company promises to be an excellent investment, as it will participate in the general world system of the Marconi Wireless Telegraph Company, Ltd., both operating stations and installing equipment.

SYDNEY, AUSTRALIA.—Enterprises involving the expenditure of large sums of money are being considered, such as a subway in the city of Sydney, substituting electricity for steam on the suburban railways, building of a bridge across the bay, and branch railway lines throughout the country for the purpose of opening up land to settlers (for which New South Wales Government contemplates the expenditure of \$14,599,500 on the extension of railway lines), irrigation proposition on the Murray River, also the improvement of highways of Sydney, and the development of water power. Increased indebtedness necessary for these industries in view of the war expenditures must be seriously considered.

MURRAY RIVER, AUSTRALIA.—A dam for irrigation purposes is being built on the Murray River where the Mitta Mitta River intersects the Murray, known as the Mitta Mitta Dam. The objective is the storage of 1,000,000 acre-feet, equivalent to 43,560,000,000 cubic feet, or 272,250,000,000 gallons of water. The dam will have a height of 94 feet from the bed of the river, so that when the reservoir is full the submerged area will be approximately 16,820 acres on the Murray River and on the Mitta Mitta River 13,482 acres, making a total surface area of the full reservoir of 30,300 acres. It is estimated that the cost will be approximately \$6,099,000, which cost will be shared by the States of New South Wales, Victoria, and South Australia, as well as the Commonwealth. This dam, when completed, will bring under cultivation, through irrigation, a large area of fertile land.

AUCKLAND, NEW ZEALAND.—The Whangarei Harbor Board has adopted a scheme for general harbor improvements, including the extension of wharf, dredging, etc., at Whangarei, an important center north of Auckland, involving the expenditure of \$562,567 to be spread over six years. A loan is to be raised for this amount at 6 per cent. It is thought the improvement of this harbor will increase the population of the district at the rate of 6 per cent per annum. It is proposed to purchase a new dredging plant, cranes, wharf fixtures, etc. The dredging and erection of a concrete wharf 500 feet long, etc., will cost \$330,922, and railway extension \$230,972. Hand in hand with these matters a plan is proposed to reclaim 1,000 acres for commercial sites, which land will be owned by the Whangarei Harbor Board. Whangarei is situated on the east coast of the North Island, 81 miles north of Auckland by steamer, and when the port is improved this town will be the outlet for the district north of Auckland, and large quantities of coal, butter, cheese, and frozen mutton will be shipped from that port.



Water Rights apparently are not all they are 'cracked up' to be, when the intelligence of the Young Idea gets to work. This story is guaranteed accurate:

One of the keepers of a large Irish estate discovered a small boy fishing in one of the streams.

"You musn't fish here," he told him; "these waters belong to his lordship."

"Do they?" said the boy. "I didn't know that." And promptly laying aside his rod he took up a book and commenced reading.

The keeper therefore departed, but returning the same way about an hour or so afterward, he found that the boy had started fishing again.

"Didn't I tell you that this water belonged to his lordship?" he roared.

"Why, you told me that an hour ago," retorted the youngster. "Surely the whole river don't belong to him; his share went by long ago."

* * *

Educating the public to a familiarity with electricity will bring certain disadvantages when the goal is attained, according to a pessimistic Western public utility official. He has lurid visions of his bill-collectors being met at the door by too-fully-informed housewives, and struck dumb with something like this:

"Say, I didn't get my full amperage last month and I didn't use within half a pint of the kilowatt-hours that you've got

me charged with. Then I think it's a measly trick, your slipping me a few weak kilowatts off the peak of the load and nearly blowing out my fuses. Then you never delivered me that alternate current on Fridays, when the card club meets at my house, and I explained to your salesman that the direct current doesn't match the polka dot stripes in my curtains and it doesn't fit in with those new jazz records."

* * *

Electrifying the home is responsible for a great deal of jubilation these days. The following joyous chant should inspire similar ones on brooms, coal stoves, wash day, and other unnecessary antiques:

DRIVE ON, ICE MAN, DRIVE ON!

By C. L. Funnell

Chew on, thou husky roughneck, chew!

Or swear or dance or sing:

Our domicile is rid of you,

Your ice—and everything!

No more your massive hoofs shall lay

A trail upon our floor

Of sand and mud and loam and clay;

No more—we said—no more.

Henceforth your flopping robe

Shall flop and rub outside

Our humble halls; and each microbe

You've brought us shall have died.

Knight of the tongs: Gaze up and bow—

Your parting manner don.

Our icebox is electric now.

Drive On, Ice Man, Drive On!

* * *

Out of the depths of bitter experience comes this plaintive psalm—and David himself would probably have forgiven the parody had he owned an automobile instead of a harp:

"The Ford is my car.

I shall not want another.

It maketh me to lie down in wet places.

It spoileth my soul.

It leadeth me into deep waters.

It leadeth me into paths of ridicule for its name's sake.

It prepareth a break-down in the presence of mine enemies.

Yea, though I run through the valley I am towed up the hill.

I fear great evil when it is with me.

Its rods and its engine discomfort me.

It anointeth my face with oil.

Its tank runneth over.

Surely to goodness if this thing follows me all the days of my life, I shall dwell in the house of the insane forever!"



Yon know the Irishman who said they had wireless telegraphy in the early days of the Celts in Ireland, as proved by the absence of wires? Well, there is equal evidence that there were electrical connections in the Garden of Eden. Just what advantages in the way of household labor-saving devices were in vogue before the invention of household labor are here vividly pictured by one of the employees of the Western Electric Company. What a shame Adam ever left simple gardening to go into the nursery business!

JOURNAL OF ELECTRICITY

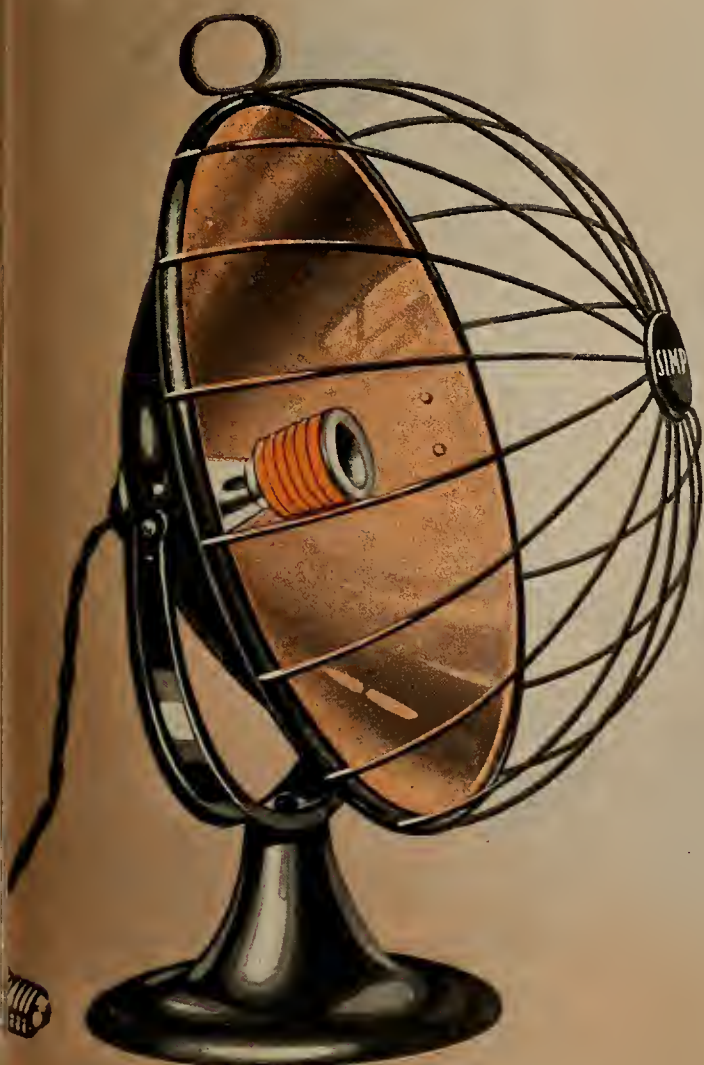
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SIMPLEX SUNBOWL ELECTRIC RADIATOR

Newest—Handsomest—Hottest



The Simplex Sunbowl Radiator throws more heat than any radiator yet made. In use it will increase its lead over ordinary radiators because its reflecting bowl is made of solid copper which cannot rust and will not become tarnished by the intense heat.

Radiator always turns face up if tipped over. Heating element unscrews like a lamp. Forest green finish — quick detachable guard, without welds, every wire firmly clamped in place.

Type No. 99 — Watts 600 — Standard voltages to 230.

Place your orders for the Simplex Sunbowl NOW!

Simplex Electric Heating Co.
Cambridge, Mass.

Pacific Coast Representatives:
M. SELLER & COMPANY
Distributors for Oregon and Washington
HOLBROOK, MERRILL & STETSON
Distributors for California, Arizona and Nevada



BIRNEY
TRADE MARK
SAFETY
CAR

Birney Safety Cars also furnish most comfortable riding. Supporting 75 per cent. of weight of carbody and passenger load on combination coil and quarter-elliptic springs at its four corners prevents carbody oscillation. The Standard Safety Car Truck is the steadiest riding single-truck ever built.

Utmost safety is also another feature which is highly important. Safety devices automatic and simultaneous in operation protect the Birney Safety Car's quickened operation.

It's a Time Saver, Alright!

One of the Birney Safety Car's most distinctive features is its ability to save valuable time for its patrons.

Its frequent service is accomplished by the operation of a greater number of cars, which is done at less total expense due to economies in power consumption and other operating and maintenance expenses. A Birney Safety Car always in sight eliminates lengthy delays on street corners.

This and its unusually quick operation—starting, running and stopping,—wins for the Birney Safety Car the hearty commendation of the public.

Railways everywhere have found that the Birney Safety Car's popularity and increased mileage obtained have more than paid for their installation. The increased revenue secured on many lines has paid for the cars within two years.

THE J. G. BRILL COMPANY

Philadelphia, Pa.

AMERICAN CAR CO.
G. C. KUHLMAN CAR CO.
WASON MANFG. CO.

St. Louis, Mo.
Cleveland, Ohio
Springfield, Mass.



JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

VOLUME 43

SAN FRANCISCO, NOVEMBER 15, 1919

NUMBER 10

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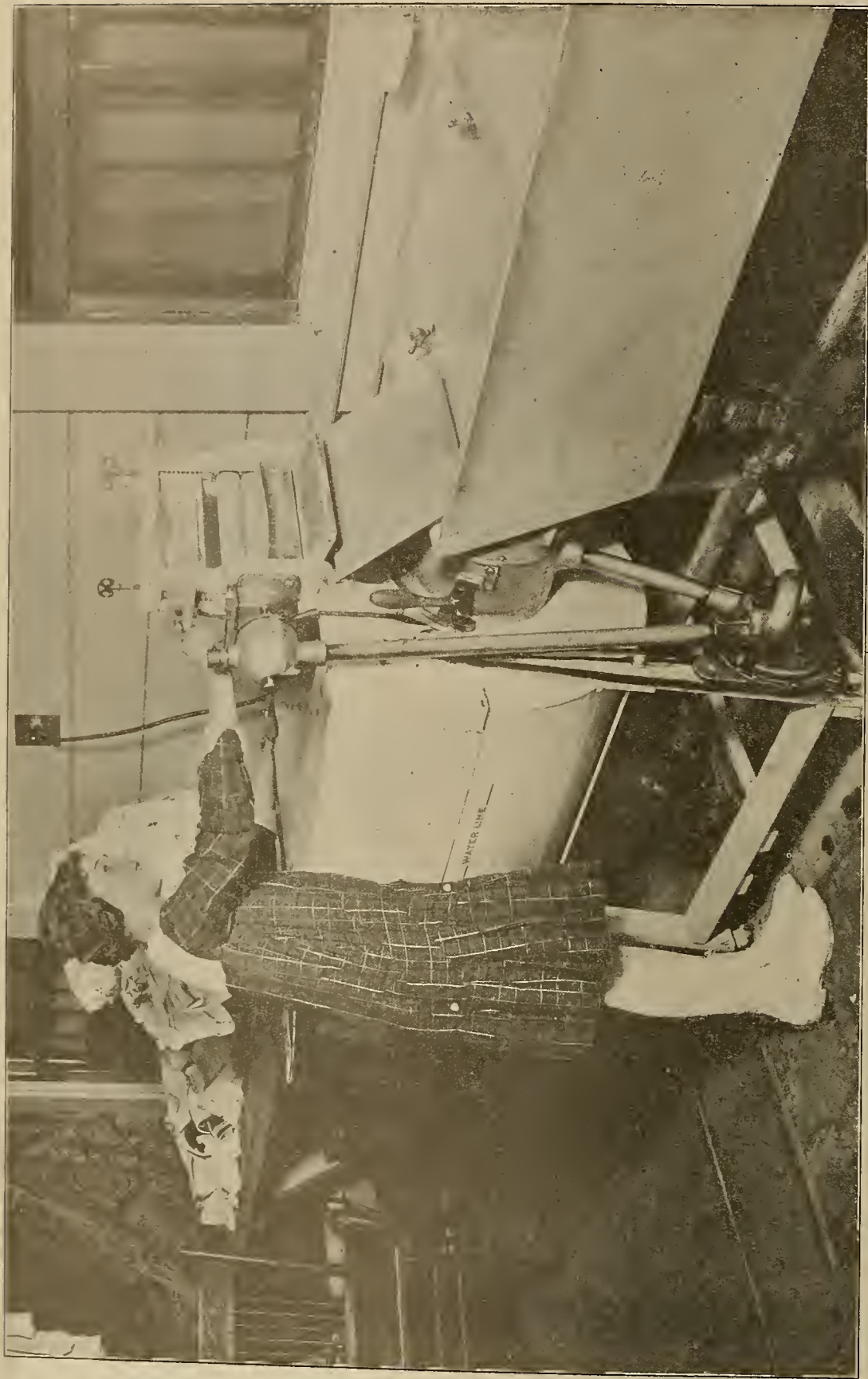
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Secretary



The fact that the West claims four times the per capita consumption of electricity of the remainder of the United States is in some measure due to the more extensive use of electricity in the home. With the high labor costs and the high standard of living maintained throughout the West in urban and rural districts alike, electrical labor saving devices are becoming more and more popular: It is an astonishing fact that a larger money value of washing machines was sold to American women last year than electric irons. In this phenomenal sale, the West had its full share — and it may fairly be said that the electric washing machine is today one of the most important elements in electrical merchandising.



JOURNAL OF ELECTRICITY



DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43

SAN FRANCISCO, NOVEMBER 15, 1919

Number 10

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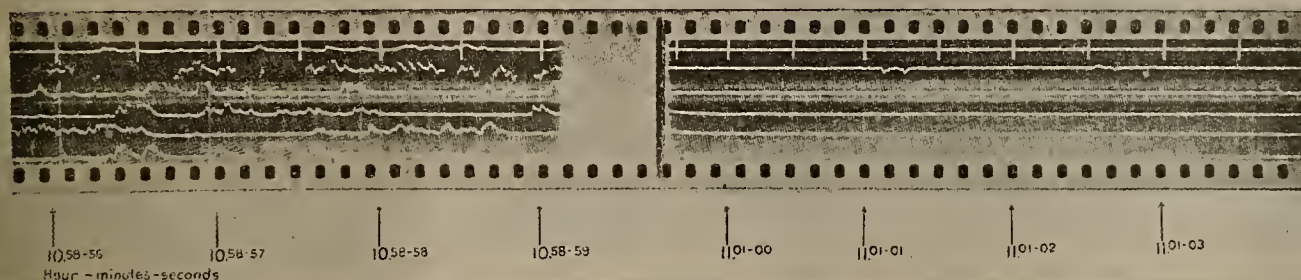
"THE END OF THE WAR."

A GRAPHIC RECORD.

One minute before
the hour.
All guns firing.

Nov. 11, 1918.
11 A. M.

One minute after
the hour.
All guns silent.



THE recording tape pictured above presents a remarkably graphic history of "the end of the war," one year ago—11 November, 1918. It is the tape from an American electrical listening-instrument on the battle-front, used to locate enemy batteries. It is calibrated to show fifths of a second of time. With photographic accuracy it illustrates the cessation of artillery activity on the American sector near the river Moselle, at 11 o'clock on the day of the Armistice. Truly, history has been here written electrically!

The perfection of sound-ranging devices is typical of the many services rendered by American engineering and technical enterprise toward the winning of the world conflict. These were among the scientific instruments which the Germans, with all their boasted efficiency, were never able to produce successfully for themselves. In "America's Munitions," the remarkable report of Benedict Crowell, Assistant Secretary of War, the uncanny accuracy of this sound-detecting equipment is indicated—one American instrument located 117 gun positions in a single day. The recording instruments, or microphones, were of a sort so delicate that their use had never been considered possible outside of laboratories; yet through American ingenuity they were employed with success amid the din and concussion of heavy bombardments. So accurately did their data check that enemy gun positions could be determined within 50 feet, by instruments several miles away.

As this little photographic film so eloquently testifies, the guns of conflict have been silenced—perhaps, as is our fervent hope, for all time. Yet Armistice Day, in 1919, calls us to face tremendous new industrial problems which bulk as great in magnitude as those of the critical war period. Civilization still remains in the balance. It is for the splendid vision of the electrical industry to assist the inventive spirit of America to triumph, now as then. It is for the men of the West to lend their wholehearted loyalty to the cause of America, so that our nation may advance as never before. Amid the rejoicing of Armistice Day, the West is not forgetful of the paths of peace, beset with difficulties, yet leading into a future which appears radiant.

The slogan that R. H. Ballard, vice-president of the Southern California Edison Company and president of the National Electric Light Association, passed out some months ago at the beginning of his term of office—

"Everybody Works"

"Everybody Works"—has indeed taken hold of the industry from one end of the nation to the other. It is interesting to note how his recent journey throughout the entire district covered by geographical sections of the National Electric Light Association, has shown activity present on all sides, and this activity will be expressed in the biggest convention electrical that has ever taken place in the nation, in the magnificent setting at Pasadena during May, 1920, when the National Electric Light

Association will hold its annual convention under Mr. Ballard's administration.

Some of the vital points that Mr. Ballard is so forcibly hammering home are: The necessity for the establishment of a sound public opinion based on service to the public rendered by utility organizations, and that this sound public opinion must be brought about by the contact with the individual of the company in rendering service to the public; and the discussion and investigation of helpful and timely problems facing the industry, such as railway electrification, water power legislation, and the establishment of uniform accounting systems under commission regulation in the respective states. These subjects are indeed timely and paramount for the welfare of the industry.

Then, too, his care and foresight in bettering the internal workings of the industry are not to be overlooked. In California, electrical cooperation has become a by-word, and the nation as a whole have their eyes focused on the California Electrical Cooperative Campaign that is now under way. In his wisdom and foresight, Mr. Ballard has appointed L. H. Newbert, chairman of the Advisory Committee of the California Electrical Cooperative Campaign, to act as chairman of his Committee on Cooperation of the National Association, and it is believed that the helpful ideals that have been brought to such forceful light in California will vastly serve to establish a working basis of cooperation throughout the industry in its work in the various nooks and corners of the nation.

Reviewing all of these activities that are now so forcefully under way, it may well indeed be said that Mr. Ballard's slogan is becoming each day more and more capable of practical application—"Everybody Works."

The recent extension of an additional 217 miles on the Chicago, Milwaukee and St. Paul Railway, that is now electrified from Seattle on East, makes an interesting addition to the electrification of this remarkable road. For the past two years, 440 miles of this railway have been electrified over the Rocky Mountain passes, thus the new addition makes available something over 650 miles, and by spring it is estimated that over 800 miles in all will be in operation.

Travelers continually going West and East over this railway, and engineers from all sections of the country, report on this very remarkable accomplishment and become enthused over the possibilities of railway electrification. Many engineers travel in a cab over the Rocky Mountain division in order that they may be directly in the locomotive to learn how control and delicate operation is performed. The entire subject of railway electrification is today being given most earnest consideration and more interest is being shown on the part of the public than perhaps any of the other great national problems concerned with fuel conservation, in that it is realized that the possibilities of railway electrification make available one of the real sources of conservation of natural resources that may be brought about within the next decade, in the saving of fuel oil, saving of coal, and the use of our vast water power resources.

The new interconnection that is now under way at Newman, California, which will tie-in the power lines of the San Joaquin Light and Power Corporation and the Pacific Gas & Electric Company, is interesting from many viewpoints. In the first place it will make one string of power lines from Medford, Oregon, on the north, down through California into Mexico in the south, and overlapping into Arizona and Nevada. Indeed, from Medford, Oregon, down to Los Angeles and up again to Wonder, Nevada, a distance of 1400 miles and over, of transmission will thus become available.

Looked at from another viewpoint, the vastness of power companies in the West is interesting. Thus, as brought out recently by R. H. Ballard in an address at San Francisco, the two companies—the Pacific Gas & Electric Company and the Southern California Edison Company combined—serve an area that is occupied by over 240 companies in New England. Truly, then we may grasp some nature of the vastness of interconnection in power service distribution in vogue in the West.

But the real vision of possibility that comes up for consideration when contemplating such vast networks of transmission out West, as instanced in this case, is the realization of the fact that since each kilowatt of power put into service means wonderful new opportunities for agriculture and industrial development throughout all time in the region served by this power, a certain new and pleasing aspect of future development for the great section of our country bordering the Pacific Ocean is thus brought to consciousness.

While it is true that some years back, the standard form of estimate sheet was gotten out by the National Association of Contractor-Dealers, which has proved very helpful to the large contractor-dealer, it is also true that no small estimate nor standard form today exists. Would it not be an excellent plan to give considerable publicity to this fact, to bring out discussions at contractor-dealer meetings throughout the West so that a standard form may be devised for use West of the Rocky Mountains where often conditions are quite different from those prevailing in other parts of the country?

The Journal of Electricity would be most happy to receive suggestions of this nature and give publicity to this matter, so that the adoption of a standard form, best adapted to Western usage, may be early adopted.

Of late there has been, perhaps, a tendency among men of the industry in California to direct their utmost energies to the success of the California Electrical Cooperative Campaign, to the exclusion of other activities of well-recognized merit. Now, by its very name, this admirable campaign is cooperative, and its wellbeing depends largely on the existence of strong organizations representing the various branches of the electrical industry. Its leaders recognize this; they have manifested no desire to subordinate organized effort in other directions. Surely, they have not requested nor required the dropping of all else to achieve success for the movement they sponsor.

There is room in the electrical field for many good and splendid things to grow up and prosper side by side. In such a big field, who shall fear over-crowding? Time has shown the essential value to California electrical interests of such representative bodies as the Pacific Coast Section, N. E. L. A.; of the jobbers' association; of the state and local

organizations of contractors and dealers; of the Electrical Development Leagues of San Francisco and Los Angeles. Each of these requires and must have the necessary driving force of enthusiasm. Their members must not become forgetful of this insistent demand. It is a question of profitable sharing of time and energy amongst several activities which are complementary.

By all means let the California Electrical Co-operative Campaign represent symbolically the co-ordinated advance of all the different organizations which long have been recognized as indispensable to the electrical industry.

Continual discussion is rife relative to how contractor-dealer stores should be rated as to workmanship and quality of material. Be it known that there is only one standard form on these subjects, and that is on the service and installation rendered to the consumer.

The Ultimate Standard Required

Such a standard is the ultimate standard of quality, both of material and workmanship, that is desired in installation of all matters electrical, and on this basis of standardization workmanship of all degrees and characters must pass the ultimate inspection and the public itself be the final judge. Such a basis of comparison avoids the boycott in its odious sense and makes possible a competition of service that relieves itself of the sting of antagonism of personality that would otherwise exist and brings to bear the very highest efforts on the part of the contractor-dealer and others engaged in forwarding the electrical industry.

A certain company paper circulated exclusively among employes not long ago solicited and obtained an advertisement from a manufacturer whose product could not by any possibility have been used by their employes. The advertiser could expect no return on his advertisement—and his expenditure of money would be incomprehensible were it not for the strange coincidence that he was at that time negotiating an order of large proportions from the company whose employes published the paper.

Every manufacturer, indeed every merchant, wholesale or retail, is familiar with the program whose publication is to be made possible through the advertisements of those who wish to encourage the cause which the program represents. Certain organizations have not been above publishing their proceedings at the expense of those who felt they could not afford to incur the enmity of the members of that organization—a mild form of blackmail.

All this is reprehensible in its tendency and a menace to the companies which indulge in it. An advertisement should be neither a gift to charity nor a bribe. The fact that merchants must meet this

situation places an unjust burden upon the advertising appropriation. Just so much of the fund set aside for advertising purposes as is diverted to the cause of charity or is parceled out in lieu of company donations to that organization's program or this customer's house organ, just so much less are the returns than those to be expected from a given appropriation. Advertising itself is discredited and in the end no one benefited.

It is of interest therefore to note that business men are taking a stand against this imposition upon their purses. One Western chamber of commerce has adopted the slogan, "No advertisement as a contribution." It may be recognized that no legitimate advertising medium will solicit donations under the guise of advertising, and such unauthorized publications as follow this practice should have clearly pointed out to them the questionable position in which they place themselves.

It is interesting to note that the effect of co-operative advertising has already begun to be felt in the attention given the electrical industry through the news columns of local papers. The electrical page which has come to be a feature of the Bakersfield Californian is but one instance of the closer cooperation of the electrical people with the daily press which is resulting from the wider recognition by the electrical industry of publicity as a factor in success.

It is hoped that in time this relationship with the press may be as close as that of the automobile industry. But in this connection let us profit by the mistakes of the automobile dealers as well as their signal successes. The automobile section of the paper is too often a mere enlarged advertisement written in news form, a series of "puffs" obviously composed by the men most interested. The public that has learned to distrust patent medicine advertisements written in news form, is quick to recognize that any "news" here presented is colored to suit the desires of the advertiser—and usually skips this section of the newspaper entirely.

Aside from the ethical question as to whether a frank advertisement should masquerade under another form, think of the opportunity which has been lost to the automobile industry to fill these columns with real news. An astonishingly large per cent of the public is interested in automobiles, and if they were sure they could find impartial, up-to-the-minute information, of the type presented in automobile magazines, would follow it closely. The electrical industry has the advantage of an even more interesting subject to present—and if it is to ask for the cooperation of the newspaper through its news columns, let it secure the full value of the space opened to it by selling the public the electrical idea through news matter which is interesting because it is to be trusted.

Selling the Washing Machine

(The washing machine is perhaps attracting more attention at the present time than almost any other electrical appliance, and is receiving a goodly share of prominence in all electrical advertising. Special factors applying to the sale of washing machines are interestingly brought out in the following symposium of actual methods used successfully in the Northwest.—The Editor.)

"The problem of selling washing machines is primarily a problem of getting the machines before the prospective buyers, and showing them what the machines will do." This statement by a dealer is borne out by the amount of special attention now being given both by manufacturers and dealers to the advertising and demonstrating of these appliances.

Advertising —

In a recent survey of Northwest activities along these lines it was found that most companies hand-

paper advertising, but rely entirely upon circular letters and telephone calls.

The Pacific States Electric Company of Portland also do no local advertising but direct the campaigns of their dealers in local newspapers through a special sales promotion bureau.

Demonstrations —

But though advertising develops prospects, a great deal of personal work is found necessary in connection with the sale of washing machines, one of the most productive being in the form of demonstrations. These are variously conducted, some companies preferring to demonstrate their machines in the stores, as in the case of the Pacific States Electric Company, the Electric Service Company and the J. C. English Company; others finding it advantageous to send out the machines on trial. The Stubbs Electric Company, who allow thirty days free trial, state that not one per cent of the machines so sent out ever come back to the store. The J. C. English Company maintain a model laundry in which

Without Wear, Work or Worry
The Famous
APEX
ELECTRIC
WASHING MACHINE
Handles Your Laundry
Every Week!



Your investigation and comparison of washing machines will convince you that the APEX is the PERFECT Washing Machine.

- 1st. The APEX is guaranteed to wash faster than others.
- 2d. The APEX employs the most harmless methods known.
- 3d. The APEX is easier to keep clean and sanitary.

Note These Features

The copper tub will never rust and will not accumulate the slimy, soapy deposit which clings to wood or galvanized metal. There is no heavy cylinder to lift out and clean and no moving parts in the tub. The Apex is practically self-cleaning.

The APEX is All Metal. Most simple mechanism of any washer construction.

TEST THE APEX FOR ONE WEEK.

It will be a revelation to you.
The APEX costs but little—sold on easy terms.

J. C. English Co. 

Upslairs at 148 Fifth St., between Morrison and Alder.
Phone Main 142.
"S & H" STAMPS GIVEN.

A sample of the advertising used by J. C. English Company of Portland, Ore., during a washing machine campaign. Large spaces were taken in the papers every day so that the subject was constantly before the public.

ling washing machines laid special stress on advertising, planning consistent campaigns over varying periods of time. The Stubbs Electric Company of Portland, Ore., for instance, put on special advertising campaigns during the spring and fall in all the city and many country papers, in which they mention the names of all their dealers. They also organize advertising campaigns for their country dealers, furnishing cuts, slides for theatres, window trims, cards and circulars. Some companies, notably the Portland Railway Light & Power Company and J. C. English Company of Portland, have experimented also with street car advertising, but have discontinued it as expensive and unsatisfactory. The latter company also furnish all their dealers in the larger cities with advertising copy, together with selling suggestions which have been tried out in advance.

The Electric Service Company of Oregon differ from most other companies in that they do no news-



The Servant Problem and the Solution —

Electric Service affords the quickest and most practical solution of the servant problem.

Don't worry because you can't get a maid who will do the washing.

Don't fret because there is a scarcity of laundresses or your laundress disappoints you.

Equip Your Home With an Electric Washing Machine

With this machine you can easily do the weekly washing yourself in less than half the time required by the laundress.

An Electric Washing Machine washes with far less wear and tear on clothes than is possible by hand.

Five cents or so for Electricity usually covers the cost of our Service.

Drop in at our ELECTRIC STORE today and let us show you

Telephone Marshall 5100

Portland Ry., Light & Power Co.



Electric Service is a Blessing on Washday

No longer is the housewife dependent on the maid, laundress or laundry. No longer need the weekly washing mean a day of unbroken drudgery, of steam tubs and boiling soaps.

Electric Washing Machines

now do the hard, unpleasant work and do it more quickly and far better than the most painstaking hand method.

We sell Thor, Eden, Maytag, "1900" Cataract and Western Electric Washers—a washer for every pocket-book.

Let us show you how one quickly pays for itself.

Tel. Marshall 5100

ELECTRIC STORE

Portland Railway, Light & Power Co.

Two effective newspaper advertisements used by a power company in a washing machine campaign. The copy is carefully phrased to appeal to the housewife

clothes can be washed, dried and ironed in thirty minutes, and except on special feature days, advertised in advance, machines are not sent out on trial. Several companies follow the plan, when a sale is made, of giving the customer a thorough demonstration in the home, in order that full efficiency may be obtained with the first wash.

Prospects —

Prospects are secured in various ways, by advertising, by personal calls, by telephone, by house-to-house canvass. In the case of the Pacific States Electric Company the sales promotion bureau assists the dealers with circular letters, following them up by the use of a card index system. The Scott Elec-

tric Company of Portland emphasize the value of good location and window displays as methods of attracting customers, believing that selling from the store is more profitable than selling through solicitors. Where these elements cannot be relied upon it is to use solicitors even though a much larger organization is required than is necessary to handle the same volume of business from the floor of the store.

Laundry Strike Settled

As Far as You Are Concerned, When You Have a



Crystal

Electric Washer & W.

Sent to

Don't forget that
as well as the washing. The
position, no need to move the tub. Our
metal—no wood.

Free trial offer expires October 10. Place your order now.
Don't wait for the final rush and be disappointed.

STUBBS

ELECTRIC CO

SIXTH AT PINE BOTH PHONES

First and last sections of a campaign advertisement which occupied almost half a page in a newspaper

Good salesmen are also extremely important, according to this company. "A good salesman is an asset, and a poor one is a liability." Stimulating the work of salesmen by offering prizes has been found effective in many cases.

The Portland Railway Light and Power Company arrange for two of the regular retail store clerks to follow up prospects in the forenoon of each day.

The Stubbs Electric Company have a plan by which the salesmen who close deals with the country dealers are followed up by regular "specialty men" at the company's expense.

Financing —

In the matter of financing, most of the companies handle their own paper, and in some cases their dealers' also. The Scott Electric Company discounts its paper to one or two companies who make a business of handling automobile paper, but makes a point of handling its own collections as this keeps it in closer touch with customers. The Pacific States Electric Company and the J. C. English Company use the Morris plan.

The usual period on time payments is about six months, though some companies give from ten to

twelve. The Electric Service Company endeavors to get at least two payments from the customer before the end of the sixty days allowed by the jobber to the dealer; the balance is then borrowed from a local bank as a straight three months' loan at 8%.

Service —


In selling washing machines most companies make arrangements to follow up their sales with a certain amount of service in repair work. Frequently the manufacturer maintains a man who is available to attend to defective machines while dealers take care of minor troubles. The J. C. English Company employs a boy with a Ford who also makes it a business to watch for new prospects and to sell both washing machines and vacuum cleaners.

Both this company and the Electric Service Company reward in cash any customer who helps to make a sale.

Summarizing the methods used to sell washing machines, the Scott Electric Company maintains that there is no actual "best way" of selling. What works in one district does not necessarily work in another, and it is necessary to use all the methods and to be continually adapting them to circumstances.

UTAH POWER & LIGHT CO.

EFFICIENT SERVICE



October 20, 1919

Dear Madam:

We know you're busy. It's in the air. There's so much to be done in every little 24 hours' round that unless you have all the colors of the rainbow, the atmosphere just naturally gets stirred up and shirly.

That's why we've made a big effort to hurry ahead a bit and help you plan for the busiest time of all—Christmas.

Christmas is wonderfully happy and joyous, but every minute is so crowded that sometimes—well it becomes a little "too much", doesn't it?

And so we're suggesting that you take time "firstly" by the forelock and start thinking Christmas—now.

In selecting gifts it has doubtless occurred to you that your family and friends—like you—are tremendously busy. Why not give them something to lighten the load—to set them free for friendly times?

You'll find electrical appliances the most welcome of all Christmas gifts. Inexpensive to buy and economical to operate, they express your thoughtfulness by years of fine, capable service.

And there's such a wonderful range of selection! Come in and let us show you the variety of beautiful, durable, electrical helpers.

Sincerely yours,

Utah Power & Light Co.

A FEW CHRISTMAS GIFT SUGGESTIONS FROM OUR LARGE AND VARIED ASSORTMENT OF BEAUTIFUL, EFFICIENT, ELECTRICAL APPLIANCES:

- Automobile Horns
- Auto Radios
- Banking Lamp
- Barbecue Cooker
- Electric Clocks
- Electric Coffee Maker
- Electric Dish Washers
- Electric Freezers
- Electric Grinders
- Electric Heaters
- Electric Irons
- Electric Kettles
- Electric Lamps
- Electric Mixers
- Electric Toasters
- Electric Vacuums
- Electric Washers
- Electric Warming Plates
- Electric Warming Stoves
- Electric Warming Trays
- Electric Warming Cabinets
- Electric Warming Racks
- Electric Warming Stools
- Electric Warming Seats
- Electric Warming Benches
- Electric Warming Chairs
- Electric Warming Sofas
- Electric Warming Beds
- Electric Warming Rooms
- Electric Warming Halls
- Electric Warming Kitchens
- Electric Warming Bathrooms
- Electric Warming Bedrooms
- Electric Warming Living Rooms
- Electric Warming Dining Rooms
- Electric Warming Parlor Rooms
- Electric Warming Study Rooms
- Electric Warming Office Rooms
- Electric Warming Library Rooms
- Electric Warming Music Rooms
- Electric Warming Game Rooms
- Electric Warming Sun Rooms
- Electric Warming Porches
- Electric Warming Patios
- Electric Warming Terraces
- Electric Warming Driveways
- Electric Warming Garages
- Electric Warming Sheds
- Electric Warming Barns
- Electric Warming Stables
- Electric Warming Kennels
- Electric Warming Pools
- Electric Warming Spas
- Electric Warming Saunas
- Electric Warming Hot Tubs
- Electric Warming Jacuzzis
- Electric Warming Steam Rooms
- Electric Warming Hammocks
- Electric Warming Lounges
- Electric Warming Seating
- Electric Warming Lighting
- Electric Warming Sound
- Electric Warming Climate
- Electric Warming Air
- Electric Warming Water
- Electric Warming Fire
- Electric Warming Earth
- Electric Warming Sky
- Electric Warming Universe

DO YOUR CHRISTMAS SHOPPING EARLY

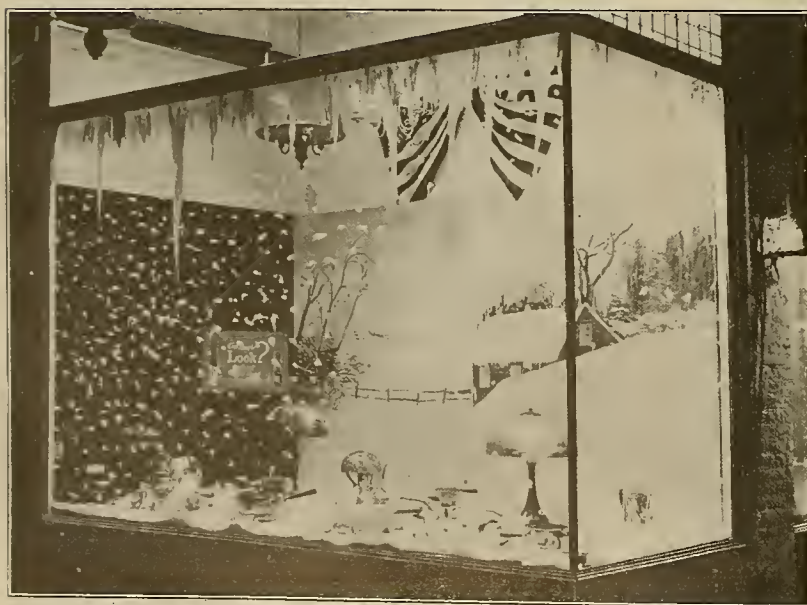
The message of the electrical Christmas is being carried to each of the 50,000 customers of the Utah Power and Light Company by this letter. The useful list at the side suggests numbers of possibilities in the way of welcome gifts which might otherwise never have occurred to the harrassed Christmas shopper, while the letter serves as a reminder to shop early.

Christmas Windows Far and Near



The brilliantly illuminated Christmas tree in the windows of the Electric Light and Power Company of St. Joseph, Mo., is a resplendent landmark impossible to ignore, and carries the idea of the Electrical Christmas to even the most casual passer-by. Note the display of appliances in the foreground.

The warm glow of an electric heater against the cold background of a snow scene makes an effective contrast in the window of the Electric Light and Power Company, in Colorado Springs, Colo. With the addition of an artistic color scheme and careful lighting a most pleasing result is obtained.



An effect such as is given by this Christmas snow scene in the window of the Rome Gas & Electric Light & Power Company of Rome, N. Y., is sufficiently striking to attract attention anywhere. Note the use of the icicles, and the way in which the white ground throws the appliances in to relief.

Promote the Sale of Electrical Gifts



A little revolving stage in a miniature theatre is the feature of this window of the Public Service Electric Company of Newark, N. J. In each one of the divisions on the stage is a doll operating an electric appliance such as a toaster or percolator, the turntable, driven by an electric motor, revolving to display each in turn.

The Union Gas & Electric Company of Cincinnati, Ohio makes use in this window of a striking illumination effect over a prettily decorated Christmas tree, with only a few appliances displayed. Even so undecorative a piece of furniture as an electric range has been successfully introduced without marring the appearance of the display.



The figures in this window, which attracted much attention in San Francisco, are merely silhouettes cut out of cardboard and skilfully colored so that the illusion of form is created. The appliances themselves are carefully subordinated in the display, but when once the prospective customer has stopped the electrical gift idea is impressed upon his mind.

A Washing Machine Service Station

(A new store which cooperates with the established dealer instead of competing with him is the service-station institution described below. Incidentally this account of a specialized business affords a number of excellent merchandising hints to the retailer of washing machines. The Editor.)

"How does it work?" is the question most often asked by the housewife who sets out to buy an electric washing machine—and then the question is closely followed by others. "Where do you set it in the laundry? How do you get the water into it and out of it? Does the wringer wring off buttons?"



THE ENTIRE STORE A WINDOW DISPLAY

The shop is illuminated and the machine kept in operation until 11 o'clock at night. The picture presented to the passer-by suffers in no way by comparison with the displays of the department stores and jewelry shops which are characteristic of the neighborhood.

Do the clothes come clean?" The electrical dealer has not always the facilities at his command to stage the demonstration which will satisfy the customer's questions, nor in many cases, the stock which will show her the size and type of machine in which she is interested.

In some cases the jobber has put his larger assortment at the dealer's convenience and it is possible for the conveniently located retailer to put on his hat and conduct his customer over to the jobber's salesroom to inspect the various machines there on display. Occasionally the dealer is in a position to have his demonstrator call at the prospective customer's residence and to get out one week's family wash. A still more effective means of demonstration, however, is that inaugurated by the Hurley Machine Company in the service station recently established by them at 124 Post Street, San Francisco.

Not a Regular Retail Store —

This is one of a series of Thor Shops which are being established throughout the United States and

marks a distinct departure in the merchandising of electric washing machines. Here is kept a complete assortment of Thor machines of all sizes and types, as well as ironing machines and vacuum cleaners. It is in the heart of the shopping district and attracts many people from among the passers-by, as well as caring for the prospects brought in or sent in by the dealers themselves.

It is intended purely as a service station, in no way competing with the dealer, or with the jobber in the field. The Pacific States Electric Company is the distributor of the Hurley Machine Company on the Pacific Coast—indeed all machines sold in the shop are purchased from the Pacific States stock, in order not to disturb the channels of trade. The Pacific States Electric Company arranges with its out of town dealers for the follow-up of the many inquiries which the Thor Shop originates.

It becomes possible for the dealer to secure skilful assistance in dealing with difficult sales problems. The shop is more conveniently located than any jobber's establishment could be, for such service, being in the very heart of the best shopping district, and is in itself an inviting place to go which has already probably caught the customer's eye.

Attractive Appearance —

Located as it is, next door to the most exclusive women's furnishing establishments, it in no way suffers by comparison in its fittings and general appeal. The floor is a clean tile, partially covered by a rug which serves the dual purpose of offering a base for vacuum cleaner demonstrations and of indicating the possibility of doing the washing even on a rug without damage. The walls are a sunny buff and are relieved from bareness by framed pictures of washing machine posters and cards which carry out the idea of the shop and provide a decorative



A CONTINUOUS DEMONSTRATION

The household articles displayed on the clothes horse were actually laundered in the shop. A demonstration of either washing or ironing is always in progress, with five or six interested witnesses who were attracted by the opportunity of learning the mysteries of washing in this unruffled and unlaborious fashion.

feature as well. One each of every type of machine is represented, one of the larger washers being connected up near the window with laundry tubs and taps and in constant operation. This serves at once as a window display and as a convenient place for demonstrations.

Demonstrations —

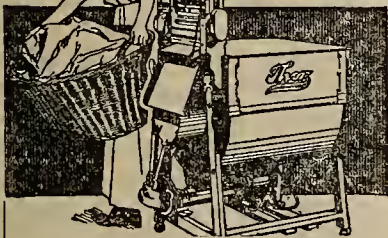
A competent demonstrator is continually at work, getting out a day's washing from the wash basket to the finished product of the electric mangle.

He Saved \$600

By Getting a

Thor

Electric Washing Machine



No Belts to Break

—or slip—or catch your clothes
Instead, the Thor is run by covered steel gears—fully ground and case hardened. You don't want belts, do you? You get a Thor.

Tested and Approved by Good Housekeeping Institute

Every housewife—every MAN of the home—should read the following letter:

"The service we have enjoyed in our household from a Thor Washing Machine, purchased from you seven or eight years ago, has been really remarkable. We have a family of three small children, consequently the laundry work has been quite heavy and the Thor has been run weekly, and very frequently twice a week for all this time without ever falling down on the job, and the machine today is in good working order, capable to do the washing for a long time to come."

"We figured out the other day that the Thor has actually saved us \$600, in addition to the great satisfaction and the saving in time, the elimination of arranging for laundresses and looking after their wants, to say nothing of the disappointing quality of the work when it is necessary to change laundresses."

"We have had the greatest satisfaction from our Thor machine, and we look upon it as indispensable to the household. We would advise the purchase of a Thor Washing Machine long before the fine furniture or solid silver, or even a piano, is thought of."

"We are so enthusiastic about it that we feel that we could convince the most doubting prospect you ever got hold of. Cordially yours,"

—River Forest, Ill.

(Signed) MORRIS E. EBERSOLE

\$11 Per Month Only a small amount down —then monthly payments.

We have made it so easy to get a Thor that no housewife should be without one. Easier on clothes than the wash board. Washes clothes just as clean. 300,000 women of America own Thor Electric Washing Machines.

But be sure you get a Thor—the machine that has the Safety Wringer Release and the Self-Cleanable Wooden Revolving Cylinder, combining the utmost cleanliness with the least possible wear on clothes.

Telephone (Insert Phone Number) for Demonstration

Just phone us and learn how you can have the Thor demonstrated in your own home, or come in and see how this wonderful machine actually works at the clothes —makes them so clean—handles them so gently. Phone or call TOMORROW.

The Thor Electric Shop
Hurley Machine Co.

124 Post St., San Francisco
Telephone—Sutter 3341-3345

Guaranteed by Hurley Machine Co.
The oldest and largest manufacturers of exclusive Electric Washing Machines in the world. Also makers of the Best Electric Irons and Thor Electric Dryers. Established 1891.

USING THE NEWSPAPERS

The electric washing machine idea is being presented to the public through extensive newspaper advertising. A series of salesletters is also going out to a selected list of prospects which are then followed up by telephone calls and personal appointments.

All this is carried out under most favorable conditions. Where a demonstration is conducted in a home, the laundry is often not conveniently arranged—or there is none at all; the machine is not set up with permanent connections—and other difficulties of the householder's arrangement may interfere. Here in a light, sunny room it is possible to show off the machine to its best advantage, and at the same time to lead the prospect on to consideration of other electric devices to complete the modern home laundry. Actual laundry work is undertaken, not the

least of the attractions to the passer-by being the neat display of carefully ironed garments

Customers Attracted —

It is surprising what interest is shown by the public at large. The moving soap suds and the busy cleanliness of the shop attract the woman who has been thinking of buying a machine but hasn't gotten down to it—and even the woman who hasn't known electric machines were available in small enough sizes for household use. Besides these casual visitors, the customers are sent in by the dealers themselves and also a selected list obtained through letters and telephone calls. The electrical subscribers of the central station form the basis of the list. The letters are followed up by telephone and if an interest is shown, by personal appointment. So successful has been this method of procedure to date, that the shop is almost always busy, there being usually five or six customers being initiated into the pleasant mysteries of the wash. An average of 12 to 20 out-of-town leads per day is no mean showing. In each case the dealer's name is recorded and kept on the prospect's card in file, so that even if a purchase is made six months later, the dealer is properly credited. In some cases the customer is turned over to the local dealer after a demonstration, in others the deal is consummated through the Thor Shop.

Cooperation with the Dealer —

The avowed purpose of the shop is, as expressed by the manufacturer, to give better service and sales cooperation to the dealer, with a view to bettering the merchandising of household labor-saving devices. Arrangements are being made by which the dealer may send in his salesman for a day's experience in the Thor Shop where he will be given the benefit of training in the special salesmanship of these devices.

An extensive campaign of newspaper advertising has been undertaken. The idea is to keep the electric washing machine as a possibility for comfort in the home constantly before the housewife—and the problem has been attacked in no haphazard way but with definite plans ahead of a year's scope.

As an attention compelling feature, however, the shop itself is its own best advertisement. During the day, the continuous entertainment of the demonstration attracts the attention of almost every passer-by, and at night the illumination of the pleasant interior is the brightest on the block. The moving mechanism of the washing machine is kept in operation until 11 o'clock—and there is always some one who finds the exhibit interesting enough to stop before it for an extended examination.

A Growing Demand —

It is interesting to note that over \$14,000,000 worth of washing machines were sold in the United States last year, dollar for dollar a greater sum than was expended for electric irons in the same time.

The San Francisco Thor Shop is but one of a series of service stations which the Hurley Company is establishing to help the dealers take advantage of the anticipated increase in demand. Similar stores have been opened in Los Angeles and elsewhere throughout the country.

Potential Publicity

BY S. M. KENNEDY

(The commuter will read the magazine advertisements, the woman shopper will read the street car cards. For thorough-going publicity all types of mediums must be used, says the general agent of the Southern California Edison Company in this third article of his series on public utility practice.—The Editor.)


In the conduct of a central station business, the subject of advertising is one that should receive as much thoughtful consideration as any other part of the organization's work. Good advertising is as useful to an electric company as it is to a department store and may readily be developed into one of the mainstays of the business. However, the methods

put a circular or letter in their hands, and it will be read from beginning to end. Consequently, if it is the desire to reach all classes, every reasonable method of attracting attention should be used. It may not be desirable to go after all classes of people at once, but the medium of advertising most adapted to reach each class should be used at a time calculated to produce the best results.

The Supremacy of the Newspaper

Effective electrical advertising should saturate the community and forcefully emphasize some definite objective. Failing in this it is incomplete and its compelling element is endangered and sometimes lost. Advertising, like literature, poetry, music, drama, art, oratory, and preaching, is not an exact science, and no theory of metaphysics can determine with anything approaching exactness the mental impression it implants. Newspaper advertising, however, in its far-reaching scope, so far preponderates all other mediums of communicating with the public, that it takes first place. In segregation, other methods can be treated as intensive, stimulative and auxiliary. The number of people who receive and read a

ELECTRIC COOKING



YOU ARE CORDIALLY INVITED TO ATTEND A DEMONSTRATION OF ELECTRIC COOKING BY THE NATIONALLY FAMOUS CHEF, A. L. WYMAN IN OUR OFFICE, 156 PINE AVENUE, CORNER BROADWAY, EVERY AFTERNOON AND EVENING FROM JULY 6TH TO JULY 8TH, 2 P. M. TO 5 P. M. AND 7:30 P. M. TO 10 P. M.

BEGINNING JULY 10TH TO JULY 14TH, EVERY AFTERNOON FROM 2 P. M. TO 5 P. M. THURSDAY EVENING JULY 13TH 7:30 P. M.

IF NOT CONVENIENT TO ATTEND TELEPHONE SUNSET 845 OR HOME 33 AND OUR REPRESENTATIVE WILL CALL

SOUTHERN CALIFORNIA EDISON COMPANY

An advertising card which appeals to the housewife and is not likely to be overlooked or ignored when once arrived at its destination

and mediums used by the department store may not be the most effective if applied to the electric company's business, and it becomes a problem or rather a study as to what direction a central station should follow, when spending its yearly advertising appropriation.

Classifying the Public

If we take it for granted that the Management acknowledges the importance of advertising, the question arises, "What are the best methods of publicity?" Probably more than anyone else, the man who advertises must put himself in the place of those whom he wishes to reach. With this idea before him he will understand how to attract the attention of the public, where to place his advertisements, and when the psychological moment arrives to produce the best results. Now, advertising of any description must attain its object by a well-defined process. In the first place it must awaken attention; next, promote inquiry; then arouse desire, and, finally, create a demand. Again it may be asked, "What is the best method of doing all this, and increasing the sale of electricity?" For the reason that the public cannot all be reached through the same channels, it follows that in various ways, all honest advertising is good. Some people never look at the advertisements in the daily papers, but will eagerly scan each advertising page in a magazine. Others never observe an advertisement in a periodical, yet their eyes catch the announcement on a bill board or the card in a street car. Again, there are others too absent-minded to note anything on bill boards or in a street car, but,



Striking folders which are easy to distribute and which arrest the attention immediately. The initial announcement, the phrasing, the color of the cover all play their part in arousing interest

newspaper is the first consideration which an advertiser gives a publication when contemplating its use in presenting his proposition to the public. Generally speaking, this is a correct hypothesis, but it is subject to many modifications. Duplicate circulation, while it may not be an entire loss, is not scientific or economical advertising. Quite a large percentage of people read both evening papers and morning papers, but the ratio is not sufficiently high to justify an advertiser who wishes to reach every home in his community in discriminating between them. The Sunday papers in the larger cities running from 100 pages up have enormous circulations, but it may be accepted as fundamental that as the size of the paper increases, the proportion of its advertising matter

which is read, decreases. Selecting the best position on the page of a newspaper on which an advertisement is to appear and choosing the page where it will be most apt to be read by the readers the advertiser desires to interest is a subject for thoughtful study. The type of copy—the nature of appeal,

They did it, not because they desired to enter the appliance business, but because it was necessary that they take the initiative in order to blaze the way for future business and the development of the central station's load.

It is due to the initiative of the central station companies that the use of electrical appliances became popular, and in nearly every town of importance in California dealers with well equipped establishments are now conducting thriving businesses. Through cooperation, the manufacturers, jobbers and contractor-dealers have now become substantial advertisers, and the character of central station advertising is undergoing a change. Instead of promoting the use of any special device or appliance, the central station company's advertising is now turning toward more general educational lines, emphasizing the many advantages of electricity and the benefits derived from electric service supplied through modern methods of distribution.

Advantages of the Large Space

It is obviously the duty of central stations to patronize the local papers in their respective communities, not only because they are good mediums for advertising, but also because they must be regarded as institutions of their respective cities and towns, and classed with chambers of commerce, boards of trade and promotion associations. Large space advertising is necessary nowadays to bring big results. Once a double column four-inch advertisement was believed to have drawing power, but a very careful keying of these small announcements proved conclusively that they could not be depended upon to produce any results in a sales campaign. Department stores and all of the larger advertisers have found by experience that an advertisement, to have selling quality, must dominate or occupy the page upon which it is printed. Some years ago a large central station company, doing business with a group of newspapers in the territory which it served, was obliged to take the initiative in introducing the lamp socket electrical appliances to its consumers, because the few dealers in the field were not in a financial position to carry on a comprehensive promotion campaign and the manufacturers were advertising almost exclusively in national publications. This company had previously followed the conventional plan of using a small advertisement in daily and weekly papers in its territory, but continued changes of copy and carefully watching for sales showed with practical conclusiveness that this method of advertising had no selling value worth mentioning.

Accumulative Advertising

This company offered a manufacturer a very large order if he would construct a certain electrical appliance, which it was believed would eventually become a necessity in every home, if offered at a popular price. As it was necessary to sell the utensil at cost, the company could not afford to boost it with a large additional advertising appropriation, and the problem of accomplishing the desired result without increasing expenditures was referred to the advertising manager. After studying the situation, he

EDISON ELECTRIC HOLIDAY GIFTS



Perfect Coffee
For serving both warm, hot, and iced coffee or milk and cream.



Perfect Toast
Toasts the slices of bread as you turn, without need for fire, fat, or salt.

Gladden and Lighten the Whole Year 'Round



Perfect Tea
For those who desire reduced water bills and perfect tea.



Perfect Kettle
For those who desire reduced water bills and perfect boiling.

IN YOUR QUEST FOR GIFTS FOR CHRISTMAS AND NEW YEARS THERE ARE NONE SO NOVEL AND UNIQUE AS ELECTRICAL GIFTS. THEY ARE BEAUTIFUL AND PRACTICAL AND ARE ALWAYS APPRECIATED. BEING IN DAILY USE THEY ARE CONTINUAL REMINDERS OF THE GIVER.

Selection of Holiday Presents from the large line of Electrical Appliances is easy and interesting—different from racking your brain choosing from the things you have always thought of.

IT IS WISE TO ORDER NOW TO SECURE PRE-HOLIDAY DELIVERY

Additional Suggestions for Electrical Christmas Gifts. Appliances that have Proved Perfect:

Baby Ovens Custardian Table Sets Coffee Machines Comb Dryers	Cigar Lighters General Utility Motors Disc Stencils Range Cleaners	Food Warmers Hot Bottle Warmers Hair Dryers Immersion Radiators Egg Cookers	Shaving Mugs Sewers Sauce Pans Water Heaters Washing Machines	Tea Kettles Table Ranges Toasters Vacuum Cleaners Vibrators
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Southern California Edison Company

PHONE SUNSET 41; HOME 111 FOURTH AND BEACON STREETS

The newspaper is the medium of advertising through which the largest number of persons may be reached. It is essential, however, that a newspaper advertisement should dominate the page on which it appears

should be made to conform to the position of the advertising. It is obvious that advertising positioned on a women's page, should have different treatment from that on a baseball page.

Central Stations and Cooperative Publicity

The electrical industry is just beginning to enter the advertising field, with the prospect of quickly becoming one of the greatest, if not the greatest, patrons of printing ink in the world. That it has not done so sooner is due to many reasons, among them being that the demand for electrical installations was so great and so spontaneous that advertising was not deemed necessary. The problem of the central station companies was to finance the construction of generating plants, transmission and distribution lines, in order to keep up with the multiplying demand of the public. But as the business developed and the size and number of generating stations increased, the question of scientific load-building had to be considered, so that the product of these plants should be constantly used, and here is where advertising stepped in, and worked to advantage. Today, an era of cooperation has been reached by means of which the various branches of the industry—the central station, the manufacturer, the jobber and the dealer—are working together for the benefit of all interested, including the general public. The time is at hand when electricity may be sold through advertising as freely as any form of merchandise, and united efforts in that direction are already producing wonderful results on the Pacific Coast.

In the West, the central stations were the pioneers in electrical advertising. They took up the work of the advertising and selling of electrical appliances before there were any electrical dealers in the territory who were interested in their sale and use.

proposed a plan which at the time was original, but has since been adopted by a number of central stations and utility corporations, and is known as "The accumulative advertising system." It consisted of an arrangement to take the total money value of the advertising which the company had paid to newspapers during the previous year; figure this amount into the number of column inches of advertising which it would purchase at the column inch rate during a calendar year, and divide the annual payment into twelve monthly instalments. The plan has now been working successfully for eight years, the advantage being of turning the small space advertising of negligible value, into a valuable asset by making it possible for the company to run page and half-page advertisements whenever it desires. The very first appearance of this large advertisement showed its drawing power, and within three months the sales of the appliance which the company was promoting had exceeded expectations by many thousands, and has now become a thoroughly standardized utensil and one of the principal articles now sold by electrical dealers. The accumulative system as it is operated by this company is believed to be the simplest form of carrying advertising accounts with a large number of papers. On the first of each year, the amount of the annual appropriation for each of the 140 newspapers on the company's system is worked out into column inches, as for example: a newspaper appropriation of \$20 per month, or \$240 a year, with an advertising rate of 20c per column inch, is entered on a loose leaf bills payable ledger sheet. At the top of one column is placed the 1,200 column inches of space which the annual appropriation purchases. The company has a drawing account against the paper for 1,200 column inches of newspaper space per year, and it can be consumed in anything from page advertisements down to one-inch notices as the re-

quirements of the business may demand. As this space is consumed, the advertising agent turns in the clipping of the advertisements to the auditing department, with the number of column inches, accompanied by a blank which shows whether it is chargeable to stock sales, new business or other purposes, and these column inches are recorded in their proper places on the cards. At any time the advertising manager can see by looking at the ledger sheet of any paper just how many column inches stand to the credit of the company for the remainder of the year, and can so arrange that his last advertising, which is usually the Christmas advertising, exactly consumes whatever space remains in the paper at the last of the year. Instead of reducing the advertising appropriations for the papers, this system has shown that large advertising space is distinctly advantageous and has resulted in general increases. There is nothing in the plan which presents additional appropriations for papers in which advertising has proven profitable. The column inches made on the first of the year can be increased, when the selling power of the paper shows that its space is valuable to the company. It is possible for the advertising manager to tell which papers are bringing results from their advertising, and to increase the company's patronage accordingly. It also gives an initiative to publishers to assist the electrical industry by news items, which tend to make the advertising more profitable, and in turn to increase its use by the central station company.

The second part of this article, appearing in our next issue, will take up advertising by billboards, electric signs, moving pictures, folders, circulars, follow-up letters and bills.



An attractive display float entered by the Valley Electric Supply Company won first prize recently, in a street parade at Yakima, Washington, amid hot competition. On the platform of a delivery truck, trimmed in gay bunting, were a gasoline driven dynamo, a Thor Electric Washing Machine, and a Thor Electric Ironer. Two neatly dressed operators demonstrated the latest wrinkles in the operation of these home labor saving devices to an interested crowd. Not only did the float capture the highest award of the parade, but it resulted in a substantial increase in orders received for the Thor electrical devices which this company features.

The Electrical Household Appliance Business

BY PHIL G. GOUGH

(The enterprise of department stores in the selling of electrical household appliances should be met by the contractor-dealer not with complaint but with increased effort and originality. The best machinery for this great business is all at the disposal of the electrical merchant, and the way to take advantage of its tremendous possibilities is here pointed out by the president of the firm of Listenwalter & Gough of Los Angeles.—The Editor.)

The rise of the greatest branch of our industry, the electrical household appliance business, is marked by the advent of the "electrical merchant." True, the "electrical contractor" is many years old and has accomplished great things for the industry. Along with his laborious duties of installation, wiring and construction he has, in many cases, stubbornly held the picture of the "electrical household" before him. From the contractor, holding this vision, sprang the contractor-dealer. While in the great majority of cases the contractor-dealer's primary interest has been in the construction end of his business, he has almost invariably displayed a disposition to improve his store and reach out as best he could for retail sales.

In every national publication that finds its way into the home the electrical household appliance announcements predominate. No longer do we gasp for breath when an appliance manufacturer states proudly that his advertising budget for twelve months will be \$100,000. It is a well known fact that the larger manufacturers of electric clothes washers are spending millions in national advertising and sales helps for their dealers. No longer are double-page electrical spreads in the weeklies having the largest circulation an exception, for they appear in every issue, and the 7,000,000 electrically wired homes throughout our country are now enthusiastic readers and believers of these attractive advertisements.

With the birth of this gigantic business, appears the electrical merchant. Certainly, the electrical merchant still has a contracting department in his institution, but his importance in his field is no longer gauged by the amount of No. 14 wire he purchases or the carloads of pipe he installs. His reputation is established only by the number of household appliances he sells into the home in an ethical merchandising manner.

The Contractor-Dealer's Opportunity —

Fortunately, in many localities the established electrical concerns have grasped the vision of the household electrical appliance field, realized its tremendous possibilities now, and have a conception of its future growth with each coming year. However, it is also a regrettable fact that many established electrical dealers have been too slow in seeing this vivid picture and, as a result, the hardware or department stores have reached out to monopolize the business. In some cases new men have stepped in with electrical household specialty shops and have picked the plum while the contractor-dealer looked on.

Surely the sale of electrical appliances for household use is the greatest opportunity that exists today

in a business way. The electric clothes washer, vacuum cleaner, range, ironer, dishwasher, etc., are articles that should be in every electrically wired home in our country. These appliances are things that all homes not only can afford to install—but cannot afford to be without. It has been clearly demonstrated by actual selling experience that it is the home of moderate means, where the mothers are brought directly in contact with the daily drudgery, that these appliances are received with the greatest enthusiasm. This business will grow in the next few years to proportions that are amazing to those who have not carefully looked into the future. A moment's thought will convince you that in only a few short years the old-fashioned rub board will be discarded entirely for the electric clothes washer, the dust-raising broom for the efficient vacuum cleaner, the gas stove for the pleasing electric range, while the adoption of the electric ironer and dishwasher will be universal.

Going After Business —

The electrical merchant realizes that, regardless of extensive national campaigns, he cannot expect to sit in his store and deal out these labor and money saving devices as the "hot dog" merchant does at a Sunday ball game. First of all, he himself must be vigorous and enthusiastic upon this subject. He must inspire his employes with the spirit of this business and send them with a message to each household. If he will study the educational books offered by the leading appliance companies on this subject and read the monthly bulletins put out by them, he will soon find himself developing into a real sales manager.

Secondly, he must advertise—he must have a definitely planned advertising schedule, for advertising in a haphazard manner without a plan or purpose is money wasted. In order to have a plan, a dealer should set aside an advertising budget. Upon close investigation, the following figures have been arrived at as being correct on the average. If your city has 50,000 people, the scheme will work out as follows and would work out proportionately with any number of people:

5 clothes washers	to every 1000 population	—250	total for yr.				
7 vacuum cleaners	" " " "	—350	" " "				
1 ironer	" " " "	— 50	" " "				
1 dishwasher	" " " "	— 50	" " "				
1 range	" " " "	— 50	" " "				
2 sewing machines	" " " "	—100	" " "				

These figures, of course, are based upon lines that are advertised nationally in a big, distinctive way and present the biggest value to the purchaser. It would be impossible to accomplish this with other than the leading lines of merchandise. With the

above picture to work from, the Electrical Merchant then makes his advertising budget as follows:

\$3.00 for each washer.....	(250)	\$ 750.00
1.00 " " vacuum cleaner.....	(350)	350.00
3.00 " " ironer	(50)	150.00
2.00 " " dishwasher	(50)	100.00
3.00 " " range	(50)	150.00
1.00 " " sewing machine.....	(100)	100.00
		yearly adver-
		tising fund.
		\$1600.00

The money must go in tying the national advertising to Mr. Electrical Merchant's store, and his results will depend on these three factors: consistency, continuity, and distinctiveness. The leading appliance companies are spending hundreds of thousands of dollars to help Mr. Electrical Merchant conduct his local advertising along these lines. Each one of Mr. Electrical Merchant's ads must connect up with the others in appearance and copy so that they will have a cumulative value. Up-to-the-minute manufacturers are willing to give these to the dealers that will follow this plan.

Helping the Customer —

Third, Mr. Electrical Merchant must sell on the deferred payment or installment plan. If sales were limited to those who could pay all cash or even a portion in cash the opportunity for sales would be limited, for very few homes have the cash on hand to pay the entire purchase price of an electric household appliance. This problem is solved by the leading appliance companies for the dealers, and certainly no electrical merchant can afford to tie up with a concern who does not offer him an ideal time payment plan to sell upon. The value of selling on time becomes more and more apparent as you get into it. It is ideal if you can offer appliances at the nationally advertised price without the addition for time payments. This plan has proven correct in the phonograph, cash register, sewing machine and other high class time payment sales schemes.

Mr. Electrical Merchant must take care of his own collections on time payment paper. This paper should never be extended over a year's period, and should be payable at least monthly. This will bring the new customer into Mr. Electrical Merchant's store at least twelve times a year, on which occasions she will become acquainted with his sales force—give him a prospect—investigate a new appliance and perhaps purchase it—buy her Mazdas—and become an enthusiastic purchaser, so that when weddings, birthdays, anniversaries and Christmas come, she thinks immediately of percolators, waffle irons, heating pads, toasters, etc. She will not get these ideas if you give her deferred payments to a bank to collect.

Fourth, Mr. Electrical Merchant must organize. He must have solicitors who arrange for demonstrations in the home. This work is most important. He must give service and good service to those who have purchased, for if they are kept satisfied, they will sell many appliances for the merchant each year with their enthusiasm. He must be forever using his ingenuity on window displays to tie in with his local advertising. He must use form letters and follow-up letters; hand out intelligently the literature

provided by his factories, and give public demonstrations in his store. He should hold weekly sales meetings and be able to key his sales force to their utmost. In short, if the electrical merchant "gets in," and ceases dabbling, he will soon see the tremendous possibilities of this business, visualize its future growth, and tell the world that it is the greatest business on earth.

Western Ideas

THE DISAPPEARING PENCIL is a familiar sorrow in all offices. People have a communistic way with pencils, and seldom seem to realize that your pet pencil may be as treasured a possession as your umbrella. However, since it is almost impossible to prevent people walking off with the office pencils, it is well to make the lost one serve the firm in another way. The Pacific States Electric Company of San Francisco has its pencils stamped with its name, and the absent-minded visitor who wanders off with one of them automatically constitutes himself a publicity agent for the company.

Of course, he may go to the trouble of returning the pencil when he realizes where it belongs, but if he does not he is still benefiting the original owner every time he uses the pencil in public, or leaves it lying around, and even if he in turn loses it again. It carries its message everywhere it goes and pays for its loss with advertising.

SHELVES IN A SHOW WINDOW not only increase the available space for the display of appliances, but lend themselves to a great variety of effects in window decoration. The placing of the



The window of Chas. N. Shannon & Company of Denver, showing the use of shelves in the arrangement of the display

articles on different levels prevents a crowded effect, and insures a better view of each one. When all are at one level those in the background are likely to be overlooked. Various pyramid arrangements, interesting lighting effects and more varied color schemes are also facilitated by the use of shelves.

An All-Electrical Christmas

(This is to be an all-electrical Christmas. The dealers report an ever-increasing demand for electrical appliances as gifts, and the Society for Electrical Development has planned a comprehensive campaign to further the idea and draw attention to its Christmas possibilities. Here are some of the publicity plans worked out to assist the dealers.—The Editor.)

The Society for Electrical Development has announced a campaign to make this an All-Electrical Christmas. Representatives of the Society have just completed a survey covering sixteen states and the

heretofore we had to go out and sell with the hardest kind of selling."

Based upon this information, the Society has prepared complete and comprehensive sales and advertising material for holiday selling. This material will comprise a beautiful poster in many colors, colored leaflets, envelope enclosures, cards for counters, cars and windows, form letters and various other advertising matter. It is planned to distribute this cooperative help to the trade at large, as in the past Society campaigns.

The material includes the following:

1. The Poster:

Partly owing to the strike but mainly because of its great success, the same poster design will be used this year as in 1917.

2. Window Cards:

Including the poster design and a compelling sales message, in colors.

3. Price Cards:

A set of 8 cards featuring electrical gifts that clean, cook, wash and iron, sew, light, etc. Complete ready for use, printed in colors on stiff cardboard.

4. Poster Stamps:

Always popular and effective. Similar to the 1917 stamps; to be stuck on packages, letters, etc.

5. Suggestive Leaflets:

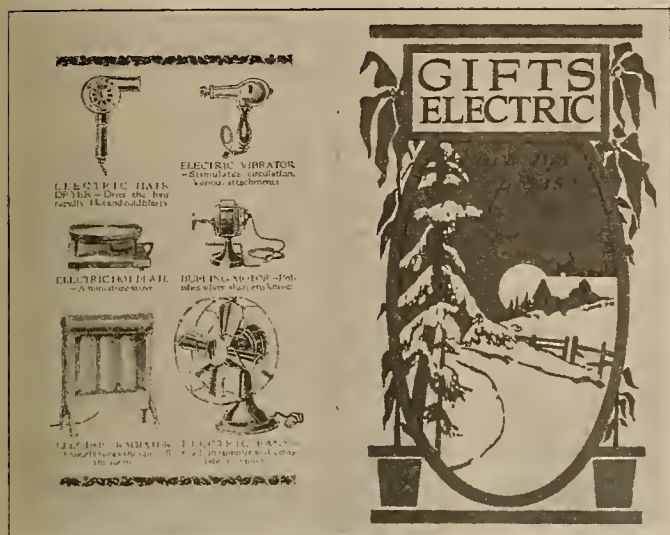
Little four-page folders suggesting over a hundred electrical Christmas gifts. For distribution through mails or from the store. In two colors, with room for imprint.

6. Printed Letters:

Two-color printed letters which will take the message "Give Something Electrical this Christmas."

In addition to these business getting helps there will be cuts for newspaper ads. lantern slides, motion picture films, newspaper items—everything to make dealer campaigns a big success.

The Society will gladly supply full details of the campaign and material upon request.



One of the folders provided for distribution by dealers, containing numerous suggestions for electrical gifts.

Province of Ontario, Canada, during which electrical conditions in every branch of the industry were studied at close range. In most cities the contractors, dealers, jobbers and manufacturers reported the greatest volume in their history. Manufacturers and distributors of electrical specialties, particularly, are far behind on orders; dealers in these devices are finding ready sale. As one retailer expressed it: "For the first time in the history of electrical appliance selling in this city people are coming into the store to buy large and expensive specialties, which



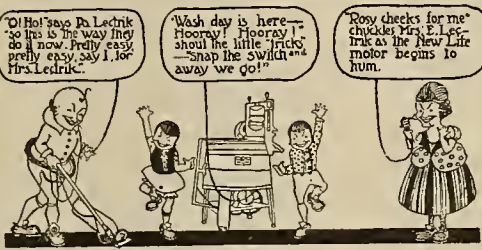
This is one of the sample windows designed by the Society for Electrical Development to aid dealers in the promotion of the All-Electrical-Christmas idea, and is included in the material and suggestions sent out. Note the poster in the background, and the use of Christmas boxes for packing up appliances.

The Washing Machine Campaign as a Business Builder

(Making a game of a campaign may bring phenomenal results. A washing machine campaign which succeeded beyond all calculations was recently conducted by the Utah Power & Light Company, and the methods used to maintain the enthusiasm are described here for the interest of all who are contemplating similar campaigns for the sale of appliances.—The Editor.)

Give a woman two "electrical" thoughts and one, almost invariably the first, will concern a washing machine.

Our experience has been that, outside of irons, no electrical labor saving device is in as great demand as the washing machine. For a number of years the popularity of the electric way of washing has been on the increase until at present the Utah Power & Light Company has reached the point where it can



Here They Are Again!

Pa E. Lectrick, Ma E. Lectrick and the little Tricks—all ready to show you how to have the help and happiness of COMPLETE ELECTRIC SERVICE IN THE HOME.

And after this whenever and wherever you see the E. Lectricks you will know they stand for all that COMPLETE ELECTRIC SERVICE IN THE HOME stands for—comfort and cleanliness, less work and worry and a saving of food, fuel, time and money.

"For," says Ma E. Lectrick, "you've no idea how simple and really economical electric service is. It's better than any hired girl because it does so many things at once and it's always ready. It cooks and sews and washes and irons and cleans—all so quickly that I have plenty of time to enjoy myself with Pa E. Lectrick and the little Tricks. And then," beams Ma, "there's always my electric vibrator to keep me perked up and looking my best."

"Remarkable," adds Pa E. Lectrick. "Remarkable and very reasonable, too, say I, with the easy payments and the thrifty operation." "Just a snap!" shout the little Tricks.

During the month of March you can buy an Automatic Washer for \$5 down and \$5 a month, and it costs only 1½ cents an hour to operate.

We will be pleased to demonstrate any of the new electrical appliances that so cheaply contribute to the happiness and comfort of the home.

Utah Power & Light Co.
"Efficient Public Service."

Kearns Building. Wasatch 500

One of the attractive newspaper advertisements used in the washing machine campaign. Advertisements to be successful must catch the eye, and hold the attention continuously, and a story device of this kind is very effective.

boast one washing machine for every five residence customers on its lines, which, considering the rather high cost of the machines, is quite remarkable. Moreover, the company's 52,558 customers are scattered through some 180 communities, practically all very small, extending from southeastern Idaho, through northern and central Utah to southwestern Colorado.

One feature which is responsible for this condition more than anything else is the company's policy of a concerted drive on washing machines during a limited period each year. The campaign for 1919 was conducted during the month of March and proved by far the most successful ever attempted.


J. F. Derge, Sales Superintendent, who had charge of the campaign, believes that the best incentive for a campaign of this kind is to furnish a mark to shoot at and then endeavor to over-shoot the

mark. In the case of the March drive the mark was 744 machines (the number sold during a two months campaign the previous year), the idea being to beat this figure in one month during 1919. The fondest hopes of every one were more than realized when the final count showed a total of 977 machines sold during the month with total receipts of \$82,631.00.

Details of the Campaign—

"Five Dollars Down and Five Dollars a Month" was the advertised feature, although no reduction was made in the regular selling price.

Central stations have a decided advantage in reaching customers direct by mail advertising, it being merely necessary to circularize its regular billing list, which list is always up to date, with an assurance that each letter will at least reach the prospect. This class of advertising was used extensively during the washing machine drive, the manufacturer cooperating in a splendid way both in circu-



Free Electricity
Utah Power & Light Co.
"Efficient Public Service"

March 5, 1919

A March event of immense interest to the Lady of the House

It would have to be a tremendously big washing that you couldn't do from start to finish within two or three hours on an AUTOMATIC ELECTRIC WASHER.

SAVES LABOR AT LOW COST

And even if it took you three hours, the cost of your current would be less than a nickel!

What is most delightful about it, the whole washing can be done with just the slightest effort on your part. No exhausting rub, rub, rub on a board, or tireless turn, turn, turn on a hand machine. It's the electric motor that does the hard labor under easy direction by you.

PLEASANT WASH-DAY

Wash-day with the old-fashioned methods is most unpleasant, whether you do the work yourself, have a maid do it, or hire a washer-woman. And it is expensive because of the time it takes—time you yourself give or have to pay for, and because of the wear and tear on the clothes.

But with the AUTOMATIC ELECTRIC even a big washing is not disagreeable. You can carry on your other household work with only an occasional interruption to run the clothes through an electrically operated wringer and hang them out to dry.

SAVES CLOTHES

The AUTOMATIC washes even the most delicate fabrics to a spotless cleanliness without tearing them. It handles heavy fabrics, such as blankets, with equal perfection, and without loss through rough usage.

FOR MARCH ONLY

In order to afford you an opportunity to enjoy the big labor-saving advantages of the AUTOMATIC ELECTRIC WASHER, we have set aside March as ELECTRIC WASHER MONTH. During March only you can secure an AUTOMATIC \$5 down and \$5 a month—one of the most extraordinary bargains we have ever offered.

Be sure to take advantage of this exceptional opportunity and join the thousands of other women whose work has been so wonderfully lightened by the AUTOMATIC.

Sincerely yours,
Utah Power & Light Co.

A preliminary letter sent out to customers to inform them of the forthcoming Electric Washer Month and of the special terms obtainable. Direct mail circularization is a reliable way to reach prospective customers.

larizing customers from the factory and also in sharing in the expense of local newspaper advertising, which was also used liberally in all papers published in the company's territory.

Close cooperation between the general sales organization and the men on the firing line, also with the credit and delivery departments, is one of the real secrets of the success of a drive of this kind.

Every cog must function properly so that each department can intensively follow its own work, without being hampered or concerned by delays or mistakes in some other department, which, of course, would slow up any campaign.

To Keep the Interest at a High Pitch —

During the campaign, reports were received daily by mail, telegraph and telephone from each office as to the number of machines sold. From these reports bulletins were prepared at least every week and sometimes oftener, showing the progress made. Such reports have a tendency to lift the work of selling from an uninteresting task to a pleasant game in which all are anxious to help win, and who does not enjoy the spirit of a game?

Progress report letters were sent out to salesmen, the third week's letter reading as follows:

To Division Managers, Sub-Offices and Salesmen:
Subject: Automatic Washer Campaign.

First Week	194
Second Week	172
Third Week	191
Fourth Week	?
Total Campaign — At least 750	

From the above figures you can easily calculate the number of machines you will have to sell in order to obtain the object of our campaign. The two months' campaign of a year ago totaled 744 machines. From the results secured during the past three weeks it would seem that the mark of the two months can be obtained in one month this year without extra effort. The question now is, how much over the 744 machines will we go by the end of the month.

Let's try to attain a Record Day, a Record Week and a Record Month, all to be secured by the results obtained in our efforts during the last week of the campaign. We feel confident that this can be done chiefly

because of the intense interest of the public which still exists in our attractive campaign feature. It has always been the experience of the past that the real impetus of the campaign is acquired in the last week.

The result of the three weeks of the campaign are as follows. You will note that the number of machines sold is well up with those of the other two weeks.

	Idaho Falls	Logan	Ogden	Bingham	Park City	Provo	Salt Lake	Western Colorado	TOTAL
Automatic No. 2	....	....	2	....	....	....	1	....	3
Automatic No. 4	8	20	20	....	....	8	27	....	86
Automatic No. 6	....	1	9	....	....	....	8	....	21
Automatic No. 10	4	7	23	2	....	3	34	....	73
Total—3rd Week	13	28	60	2	....	12	70	6	191
Total—2nd Week	13	23	42	2	7	24	48	6	172
Total—1st Week	18	19	47	5	5	23	71	6	194
Total—Three Weeks	44	75	149	9	12	59	189	20	557

Valuable “Bi-products” —

Does the average dealer object to the conducting of such campaigns by the central station? Apparently not. Reports from dealers in the Utah Power & Light Company's territory indicated that their washing machine business was greatly stimulated by the intensive advertising of the power company.

Another valuable feature of such a campaign, aside from immediate results, is the effect it has on sales of the particular appliance advertised for several months following the campaign, and also increasing the sales of all kinds of electrical devices, no doubt due to an appreciation through education of the immense labor saving qualities and comfort of the “electric way.”

The Public Library for the Business Man

(It is not only the Business Library which is helping to solve the problems of the business man: the Public Library is constituting itself an invaluable aid by catering extensively to the commercial and technical needs of the community. The following account of the activities of the Seattle Public Library will give some idea of the extent of this service, and the methods by which it is brought home to the public.—The Editor.)

“For Information—Think Public Library first! You get the last word on any subject—Trade statistics — Business methods — Manufacturing processes.” In this wise does the Seattle Public Library advertise its service to business men. Due to its location in the center of the business section of the city, the central library is able to offer the business man the service which in many public libraries is rendered through a business branch. This work is carried on through the technology room and general reference room. The one constitutes a technical reference bureau and a book laboratory for research of a scientific nature, the other a statistical and commercial information bureau.

As such, the Seattle business man depends upon the library to secure for him certain types of information. A question arises during the course of the morning's business, it may be the London price of tin, or the amount of wheat exported during the year. He does one of three things: sends his stenographer to secure the information, drops into the library himself during his lunch hour, or better yet, calls on the telephone and gets the data without leaving his office.

Variety of Demand —

A busy day in the technology room finds a prominent banker looking into the feasibility of manufac-

turing silk in Seattle; a local exporting firm interested in methods of exterminating the Mediterranean flour moth; an out-of-town geologist studying the oil deposits of an adjacent oil field; the advertising agent for a local milk concern reading up on the chemical composition and food value of milk; a mining engineer looking into mineral resources of Siberia; and a local chemist working on the identification of some Oriental beans.

Books for home use are lent as well, on such subjects as scientific management, business correspondence, office organization, filing, advertising, accounting, credit systems, show-card writing, and salesmanship.

The technology room shelves a reference and circulating collection of 23,000 books on scientific and technical subjects, the scientific and technical society publications and periodicals, and the federal and state documents of value for technical reference. The current periodicals, about 200 in number, furnish the up-to-date information necessary to the business man or engineer if he is to keep in touch with the advances being made in matters connected with his specialty. Certain of these periodicals—the Official New York Metal Report; the Oil, Paint and Drug Reporter; the Engineering and Mining Journal; and the Iron Age—are consulted daily for

their market prices; even the advertising columns are useful to the man with something he wishes to buy or sell.

The collection of engineering handbooks is a mine of condensed technical information. There are compilations of the technical data, formulas, and tables most needed by the practicing civil, mechan-



The library building at Seattle

ical, electrical, or mining engineer. An engineer does not always care to own all the handbooks which he at times may wish to consult. He will have certain ones in his office, and for the occasional reference to the rest, he goes to the library.

Meeting Local Needs —

Library service to the business man tends to proceed in certain directions, these being the more



The Technology room is constantly busy, large numbers of men of the most widely various professions finding it an indispensable source of information.

important industrial and commercial interests of the city. Seattle is primarily a port and many commercial enterprises of the city exist because of this. The interests of importing and exporting firms are as diverse as are the commodities they handle. "What are the regulations governing the importation of this produce" and "What are the economic uses of that" are questions asked continually. Or

the representative of an importing firm comes to the library with a bill of lading recording the shipment of so many barrels of something with a strange name. He asks, "Can you identify this for me? And just what is its use commercially?"

The utilization commercially of products passing through the port is a question about which the alert, far-seeing business man is thinking. For example, large quantities of vegetable oils are shipped through Seattle from the Orient. Daily the library puts the right books into the hands of business men working on the solution of the problem of using these oils in local industries. So the Technology Room is rich in material dealing with vegetable oils, their refining,

BOOKS for Shipbuilders



Books on Business
at
The Public Library



FOR INFORMATION—

THINK Public Library first!

You get the last word on any subject
—trade statistics—business methods—
manufacturing processes.

Come to Reference room or call Main 2466.
A trained staff will assist you.

By means of attractive posters the library spreads the word of its specialized service to all types of workers, emphasizing particularly those activities in which Seattle is mainly interested.

their chemistry, their uses commercially. It also has books about the plants that are the source from which the oils are extracted, and their cultivation.

The collection of books and periodicals covering the subject of industrial chemistry has been built up to meet the ever increasing requests that come from chemists and manufacturers. It is surprising how great a number of manufacturing processes are chemical in nature, or are dependent at certain points upon the knowledge of chemistry.

To advertise the library's book service to the city's biggest industry—one employing 2,900 men—there has recently been put up throughout the shipyard sections of Seattle an attractive poster, announcing "Books for shipbuilders and other skilled workers at the Public Library—why not use them and get ahead?" This is a case where service to the skilled mechanic is in a sense service to the business man.

Special Requirements —

Located in the center of a group of rich coal mines, and at the point at which Alaskan miners and engineers embark and disembark, Seattle is a center of mining interest. So the use made of the geological and mining resources of the Public Library is a large one. A complete file of the bulletins and topo-

graphic and geologic maps of the U. S. Geological Survey and the Mines Bureau, with the state and Canadian geological and mining reports, provides the mining engineer or the prospector with information which he could secure from no other source.

The Seattle Public Library has a well rounded collection of engineering and business books, and is endeavoring to keep step in a book way with the industrial development of the city it serves. It may be said that it is known in library circles especially for its advertising, and this extends to the advertising of business books.

SAN FRANCISCO ELECTRICAL DEVELOPMENT LEAGUE

BY HENRY BOSTWICK

(Electrical development leagues situated in the populous centers of the West are capable of vast possibilities in forwarding the electrical activities of the community. Here is an article by the San Francisco district manager of the Pacific Gas & Electric Company which tells of some of the accomplishments and aspirations of the San Francisco Development League when the author recently retired as its president after a most successful term of office.—The Editor.)

Among matters worthy of mention in connection with the recent work of the San Francisco Development League, is the action taken by the League in connection with the proposed amendments to the Industrial Accident laws which vitally affected electrical interests as a whole; also the matter of co-operating with the Department of Electricity, looking to the retaining of sufficient inspectors by the city covering the inspection of electrical installations.

The League's activities in matters of this kind should be continued and it should be the duty of the League to keep in close touch with all state and municipal legislation which in any way may affect the interests of the electrical manufacturer, jobber, contractor-dealer or central stations. This can be accomplished in no better way than by having committees whose duty it shall be to keep in touch with such legislation.

Participating in Civic Affairs

There is no good reason why the San Francisco Electrical Development League should not play as important a part in the civic affairs of our city as any other organization within our midst. I cannot conceive why the electrical industry should not be as much to the forefront in all local affairs as the Rotary Club, the Down Town Association, the Home Industry League, the Commonwealth Club and other similar organizations. The only reason that I can assign for the fact that the electrical industry has not been a prime mover in all such affairs, notwithstanding the fact that it is composed of shining lights, is that the objects of the League have not been brought clearly home to us all, and in order to bring them more forcibly to the attention of the members of the League, it would not be amiss to have Article 2 of our constitution and by-laws printed on a neat card and sent to all members, "lest they forget." The machinery to put the League in the place where it belongs, so far as our civic affairs are concerned, is at hand, and all that is needed to

put it into operation is the appointment of the necessary live committees whose duty it should be to spread propaganda of the aims and objects of the League as laid down in Article 2 of our constitution and by-laws.

United Forces —

Now as to the recommendations made by the Public Policy Committee: they are all worthy of the very fullest consideration at the hands of the members of the League. To my mind too much stress cannot be placed upon the suggestion of the committee with respect to the consolidation into one electrical organization of all the several separate and distinct organizations now representing the electrical industry in our city, but whose aims and objects are all virtually the same, and when one stops to consider that in organization there is strength, one need only to pause and visualize for a moment what a powerful organization there would be if the several electrical organizations were moulded into one body, and I cannot help but feel that the effectiveness of such an organization would be more far reaching and accomplish better results for all concerned than are being accomplished at the present time.

There is also the matter of an electrical building where the electrical interests could be properly housed and have one common meeting ground. This recommendation is worthy of thoughtful consideration at the hands of the League. There is also the question of spreading propaganda, acquainting the electrical fraternity at large with the fact that there is such a thing as the San Francisco Electrical Development League; that the League is holding weekly meetings and that all visiting electrical men from out-of-town are welcome to come and participate in our meetings as guests of the League.

Supporting the Cooperative Campaign —

The Electrical Cooperative Campaign should continue to have the hearty support of the electrical industry represented by the League members, to the end that it may carry on the constructive work which it has in hand. It is interesting to note that the Campaign has attracted the favorable attention of the National Electric Light Association and that President Ballard has named a committee to present a report on cooperation between manufacturer, jobber, contractor-dealer and central station at the next convention of the association to be held in Los Angeles next year.

I cannot close without calling attention to the fact that we have in our city what I consider one of the most up-to-the-minute electrical publications in the country in the Journal of Electricity, which I know is at all times eager for news affecting our industry, and I am sure that its columns are open for the use of the League in any matters which it may desire to put forward for the good of the cause.

In closing I will say that the officers-elect have work mapped out for them, and I hope that the day is not far distant when the San Francisco Electrical Development League will awaken and become the potent factor that it should be in our civic affairs. The by-laws have provided the machinery; let us get together and put it into operation.

The Case for Advertising

BY G. DOUGLAS MANTLE

(In spite of the large part which advertising plays in modern business it is a fact that numbers of companies, especially among the public utilities, have no settled advertising policy. The following discussion of advertising formed part of a paper read before a convention of the Pacific Coast Gas Association at Los Angeles. The author, who is an advertising specialist, is with the D. H. McCorkle Company of Oakland, California.—The Editor.)

It is estimated that \$750,000,000 is expended annually on advertising in the United States, and of this sum by far the greater portion is spent by companies in the highest standing, whose appropriation increases year by year, and who will frankly admit that without this stimulus to their business they could scarcely exist.

The American Bankers' Association, comprising the principal banks of America, were asked by Printer's Ink in 1914 if they would take into consideration in granting credit the good-will created by advertising. A majority of those who replied stated that due consideration for this good-will should be given in extending credit, and one bank, which is generally regarded as conservative, went so far as to say that "a certain proportion of the advertising expenditure should be shown on the books as investment, the portion to be determined by a comparison of the results which had been obtained, with the reasonable expectation of results to come in the future."

In 1919, but five years later, practically all of the banks addressed are themselves using advertising space freely.

With this example of the development of advertising in this necessarily most conservative profession, it becomes almost a platitude to say that advertising is an absolute necessity to modern business.

Essentials of Good Advertising —

Advertising is not a matter of filling a certain amount of contracted-for newspaper space with words. It is as much a science as any branch of engineering, with definite rules for the application of definite psychological forces.

The successful advertising campaign must be planned far ahead, allowance must be made for every influencing factor, favorable or unfavorable, and through all the idea must remain uppermost that the campaign has but one object—to sell.

Close cooperation with the sales department is essential, and to ensure success the sales and advertising departments should work together as one unit, for it is just as possible for one department to completely nullify the work of the other by lack of harmony, as it is possible for both to more than double their efficiency by careful coordination of effort.

Advertising and personal salesmanship do not conflict in any way. On the contrary skilful advertising must be of great assistance to the salesman.

It may be said that there are four distinct phases in the accomplishment of any sale: (1) Obtaining the prospective customer's attention; (2) Creating the desire for the article that is for sale; (3) Making it clear that the article is easy to purchase; (4) Obtaining the signature to the order.

No one who has had experience can seriously dispute that the salesman is necessary in completing phases (3) and (4), that is in answering inquiries created by the advertising and in closing sales. It has however been proven beyond the shadow of a doubt that phases (1) and (2), the attraction of the attention of the consumer and the creation of the desire to buy, are more efficiently accomplished by intelligent and consistent advertising than by direct sales effort.

The salesman may make his twenty or thirty calls a day, but it is only by the rarest of luck that he calls upon the consumer at the psychological moment.

The newspaper, on the other hand, carries the message into the great majority of homes every day, and by intelligent presentation and constant reiteration drives the point home slowly but surely.

The old time "solicitor" seems to be rapidly becoming extinct, but advertising makes possible the employment of a different type of salesman at higher remuneration because of the increased efficiency of his efforts.

The Tests of an Advertisement —

A good advertisement must satisfactorily answer five questions: (1) Will it attract the attention of the consumer? (2) Is it specific? (3) Is it forcible? (4) Is it sincere? (5) Is it plausible?

No piece of copy should be allowed to go to press which does not satisfactorily answer these five questions. Every word that is extraneous to them should be eliminated.

In writing copy it should be borne in mind that the reader of a newspaper does not primarily desire to read the advertisements and it is almost against his will that his attention must be attracted and held until the story is told. In preparing copy, therefore, the writer must put himself in the place of the prospective consumer and only present such matter as will be of definite interest and at the same time create the desire to possess.

Study of a skilfully composed advertisement will show that when the attention has once been attracted to the first line it is difficult to stop reading until the whole story has been absorbed. The subject is smoothly and logically developed from the first interest creating sentence to the final urging to immediate action.

An advertisement consisting of bald, disjointed statements, or containing matter extraneous to the five essentials is not efficient. The attention of the reader will wander from the subject at the slightest excuse and cannot then be regained.

If the appliance advertised has many points of appeal, the main portion of each of a series of advertisements should be devoted to one of these points,

with but the briefest summary of the rest. An advertisement containing too many points of appeal becomes confusing and has no retention value.

Advertising Must Be Consistent —

The habits of consumers are not changed in a day, and just as it is the constant drop of water that wears away the stone, it is the consistent advertiser who produces results.

Advertising, with the sole purpose of attracting the attention of consumers and creating their desire for the appliance to be featured, should be run long before the commencement of any special sales campaign. When the campaign actually starts large spaces should be devoted to purely merchandising copy, that is, to convincing consumers that the appliance is easy to buy and to securing their immediate orders. To start advertising and campaign at the same time is greatly to reduce the efficiency of both efforts.

In this connection it is suggested to the smaller companies that they should use advertising space consistently throughout the year, and reap the harvest of their advertising by means of periodical sales campaigns. By arranging these campaigns to follow one another in a number of adjacent towns, these companies might profitably follow the example of the California electrical fraternity in hiring one good salesman to work for several companies.

The Advertising Appropriation —

Two factors decide the amount of money which can be spent on advertising by any company. First, the volume of new business it is possible to obtain; second, the amount that can profitably be spent to secure that new business. If it can be shown that a definite volume of new business can be obtained for the expenditure of a portion of the receipts which still leaves a good margin of profit the question of the advertising appropriation becomes a simple business proposition and should be decided as such.

It is true that the most experienced man cannot say that the investment of a certain sum in advertising will produce a certain definite volume of new business, and for this reason advertising is still regarded by many of the older school of business men as more or less of a gamble. The skilled advertising man has, however, learned from the most excellent of all teachers, experience, that a certain sum invested in carefully planned publicity must result in returns which approximately average.

The general practice in allotting appropriations to the sales and advertising departments appears to be to increase the previous year's appropriation a little if times are good, and to reduce it considerably if times are bad. Consequently it is almost impossible for either department to plan its work ahead intelligently and the results obtained are far poorer than they otherwise would be. For this condition of affairs I believe that we, the sales and advertising men, are totally to blame. It is not to be believed that an expenditure of thousands of dollars upon some engineering improvement is made at the direct instigation of the executives of any company. On the contrary, the engineering department, before

asking for any appropriation, is careful to prepare an elaborate report proving that the advantages of the improvement in question will more than outweigh its cost, and it is only on the conclusive showing of this report that the expenditure will be approved.

The new business departments do not, on the other hand, prepare a statement of anticipated results which would justify an annual appropriation commensurate with the work, which in the interests of the company alone, they should be expected to do.

If those responsible for the new business departments would carefully survey their territories and decide upon the volume of new business they could reasonably expect to produce during the coming year, and could undertake to secure this new business at a cost which would be profitable to the company, they would be in a position at least as favorable as that of the engineering or other departments in asking for appropriations.

It may be objected that whereas engineering improvements are a capital charge, advertising must be charged against expense. The opinion of the American Bankers' Association should cover this objection, and while it is not claimed that it would be good bookkeeping to charge advertising to anything but expense, the good-will created by advertising is as valuable an asset to any company as any of the material that appears on the inventory.

When the new business departments undertake to secure a definite volume of new business during the year the company has automatically adopted a policy of expansion which must not only increase its good-will value, but at the same time have a vitalizing influence on every officer and employe. Further, the sales and advertising departments are for the first time placed on a definite efficiency basis.

Some time ago the writer had occasion to make sales analyses of the properties of a large holding company, the investigation covering a number of large and small subsidiary companies operating under a great variety of conditions. In every case it could be shown that the saving effected by a reasonable increase in output more than offset the cost of securing the new business. Peculiarly enough, the worse the apparent financial condition of the company, the more was new business effort necessary. In fact, we were able to show that two companies, the condition of which was regarded as desperate by the holding company, could be put on a solid financial basis by a little consistent and efficient new business effort.

The issue of December 15th will be a special issue featuring publicity from every standpoint in relation to the electrical industry. There will be new plans for conveying the electrical message to the public as well as methods which others have found successful. Find out what the others are doing.

Better Lighting

(That output is definitely increased by improved lighting was one of the interesting points brought out at the recent lighting exhibit described below. The advertising value of good store illumination and the pleasing effects of correct home lighting were also illustrated with marked success, and it is expected that much good will result from this move in the 'better lighting' campaign.—The Editor.)

Public interest in better lighting in the home, shop, factory and show window was greatly stimulated by the recent Mazda Lamp and Lighting Exhibit of the Edison and National Lamp Works of the General Electric Company at the California Industries and Land Show, held in San Francisco. The



As a selling factor the well-lighted store window has double the value of one which is poorly lighted. Correct and effective illumination should be an integral part of the display.

exhibit was educational in character, its primary object being to show by actual demonstration how better lighting can be obtained with Mazda lamps properly equipped with modern reflectors and electrical furnishings.

Home Lighting —

A model living room•16 by 24 ft. in size, completely furnished and lighted with suitable side brackets, a Duplexalite ceiling fixture and floor and table lamps, offered suggestions for home lighting. Each of the three different kinds of fixtures was controlled by a separate wall switch which made it

possible to demonstrate the effect produced by side brackets, the ceiling fixture or floor and table lamps separately, or any combination of the three. An experienced attendant operated the switches while explaining the object of the display, calling attention to the advantages of the three kinds of fixtures and the ease with which glare could be eliminated from the home by the proper selection and arrangement of the electrical furnishings. If the expressions of delight and the questions asked by the ladies may be



The elimination of glare and harsh effects is provided for in a most satisfying way by up-to-date home lighting devices. Note the absence of heavy shadows and unpleasant lights in this restful room arranged for the lighting exhibit.

taken as a criterion, there can be little doubt but what this part of the exhibit was well received and will be the cause of a higher standard of illumination in many homes.

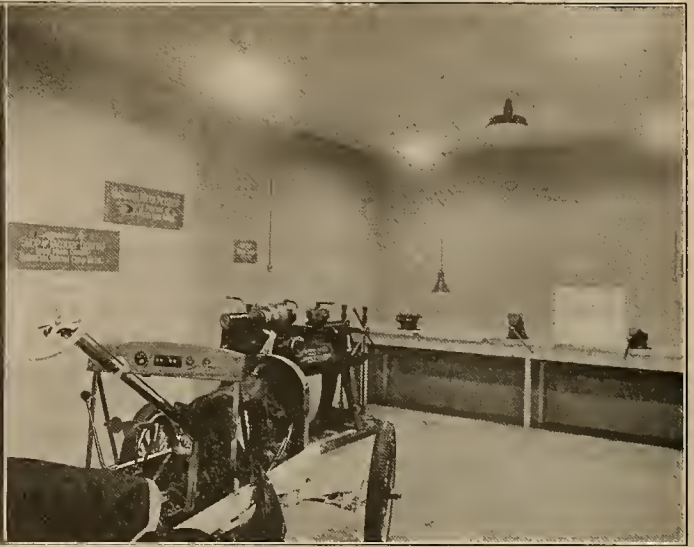
The Display Window —

For the benefit of the merchant, a modern display window, 16 feet long by 6 feet deep, lighted with

TESTS TO DETERMINE EFFECT OF GOOD LIGHTING ON PRODUCTION

	Test No. 1 Ironing Pulley Finishing Shop	Test No. 2 Soft Metal Bearing Machine Shop	Test No. 3 Machine Shop Handling Heavy Steel Parts	Test No. 4 Carburetor Assembling Shop
Floor Area in Sq. Ft. Old Equipment	3200	2400	2320	4000
	60 watt drop cords bare and with tin shades	100 w. Mazda with deep bowl reflectors	100 watt Mazda "C" modern reflectors	40 w. & 100 w Mazda bare tin shades and in clusters
	0.27 w. per sq. ft. 0.2 ft. cdl's.	1.0 w. per sq. ft. 4.6 ft. cdl's.	0.6 w. per sq. ft. 3.0 ft. cdl's.	1 w. per sq. ft. 2.1 ft. cdl's.
New Equipment	200 w. Mazda with modern reflectors	200 w. Mazda with modern reflectors	300 w. Mazda with modern reflectors	200 & 300 w. Mazda with modern reflectors
	1.9 w./sq. ft. 4.8 ft. cdl's.	2 w./sq. ft. 12.7 ft. cdl's.	1.7 w./sq. ft. 11.7 ft. cdl's.	1.9 w./sq. ft. 12.5 ft. cdl's.
Increase in gross cost of New over Old Lighting	\$105.00 per month 5.5% of pay roll		\$29.00 per month 1.2% of pay roll	\$57.90 per month 0.9% of pay roll
Average Increase in Production	Test records 20% All records 35%	15%	10%	12%

The tests here shown were made in Chicago by the Commonwealth Edison Company, and were based on a fair proportion of work done during dark hours or where work was little affected by daylight. Both hand and machine work were included.



The picture on the left illustrates the incorrect way to light a workshop—with ordinary ceiling lights, and unshaded lamps on drop cords. It will be noticed that the light is very unevenly distributed, and exceedingly trying to the eyes. On the right is the correct illumination, with a steady, evenly-distributed light, obtained by means of reflectors, and no dark corners. Actual figures have been compiled to show that good lighting has a very marked effect upon production.

modern show window lighting equipment, was arranged with a display of highly colored ladies' wearing apparel. Three switches, conveniently placed, controlled the lights so that the following could be demonstrated:

- (1) Intensities of daylight quality of light from the Mazda Daylight lamp suitable for the down town store.
- (2) Intensities of light from the Standard Mazda C lamp suitable for the down town store.
- (3) Intensities of light from the Standard Mazda C lamp suitable for the small town or outlying sections of the large towns.
- (4) The effect of mixing the light from the Mazda Daylight and the Standard Mazda C lamps.

An attendant in charge explained to the interested merchant the advantages of modern display window lighting with the proper lamp and reflector equipment properly placed and concealed, the advantage of suitable color and texture of the window background, as well as the advantages of the multiple switch control which allows the window trimmer to obtain the lighting effect desired for any particular trim by varying the quality and quantity of light.

Lighting and Production —

Good and bad shop and factory lighting were demonstrated in a model repair shop lighted correctly and incorrectly. The incorrect method consisted of ceiling lights for general illumination and drop cords, some with bare lamps and some with reflectors for local illumination. The correct method consisted of 6 Mazda C lamps equipped with Ivanhoe RLM reflectors and Genco diffusing caps, producing a high intensity of evenly distributed illumination without glare or objectionable shadows. Each system was on a separate switch which was in charge of an experienced industrial lighting expert, who explained to the visitors the good and bad features of the two installations.

By means of a chart showing the results of a lighting survey in a large number of industrials, to determine the actual effect of good lighting upon production, the attendant pointed out to the plant man-

ager in definite terms the value of good lighting from the standpoint of increased production. Because of the comparatively high wages paid skilled workmen at the present time and the desire of shop managers to increase production to the greatest possible extent, this part of the exhibit seemed to create the greatest interest.

ENGINEERS OF YESTERDAY

(Series Compiled by A. L. Jordan)

17. The Montgolfiers Brothers

Who were the first balloonists?



The brothers, Joseph and Jacques, were sons of a paper-maker at Annonay, France. While observing the clouds they reasoned that some other "vapor" might be supported as well. Small paper bags filled with smoke were sent up in 1782 and a large linen balloon in 1783 (repeated soon afterward at Versailles in the presence of the court—see picture).

In this same year a hydrogen balloon, under the supervision of the physicist Charles, was sent up, and in this year also a man named de Rosier made the first ascension, using a hot-air balloon.

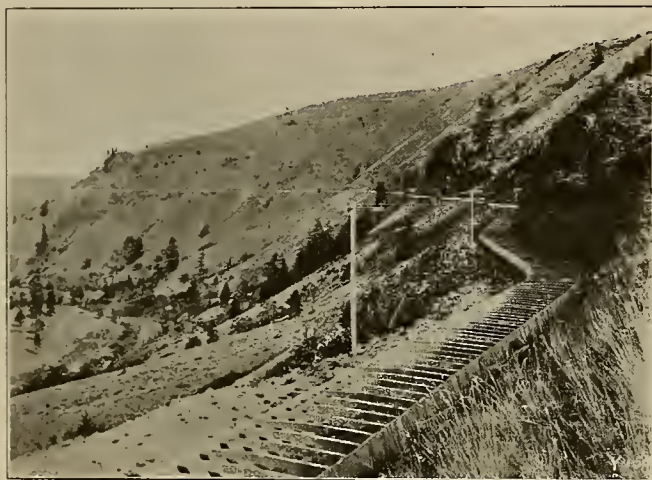
One of the brothers (Joseph) invented the hydraulic ram in 1796.

Electrically Operated Wasteways of the Tieton Canal

BY C. F. GLEASON

(Irrigation, which is playing so prominent a part in the development of the West, is constantly bringing to the front interesting new applications of electricity. Among the most important features of the Tieton Irrigation Project are the electrical devices described below, used in the operation of the canal. The author is engineer with the U. S. Reclamation Service at Yakima, Washington.—The Editor.)

The main canal of the Tieton Irrigation Project, completed by the U. S. Reclamation Service in 1911, is provided with a system of electrically controlled wasteways calculated to minimize damage to the canal and delays in the delivery of water due to rock slides or other accidents. The intake of this canal is located about 30 miles west of Yakima, Washington, and diverts water from the Tieton river. From the intake the canal runs along the side slopes of the deep precipitous canyon of the Tieton river for a distance of approximately 12 miles, the water being



View of the Tieton Canal near Spillway No. 5. The length of the canal is approximately 12 miles and its capacity 330 cubic feet per second.

carried in a succession of tunnels and concrete flume sections. The capacity of the canal is 330 cubic feet per second. Of the total length of 12 miles, 2.1 miles consist of tunnels, the remainder being a semi-circular concrete flume 8 ft. in diameter resting on a bench excavated along the hillside. The character of the country is difficult for a canal location. Steep slopes covered with loose rocks and boulders and broken by numerous cliffs, extend in some places for 1,000 feet above the canal and the flume is therefore exposed to the danger of rocks rolling down and demolishing it or falling into it and causing the water to overflow the sides.

The amount of damage done by a rock would in itself in most cases be slight and easily repaired, but the escaping water, if allowed to flow for any length of time, might do great damage by washing away the hillside and undermining the foundations of the flume. For this reason a scheme, whereby the flow of water would be quickly and automatically stopped following such an accident, was considered to be highly desirable.

Wasteways

For this purpose there was installed a system of electrically operated wasteways. The wasteways are five in number and are located at approximately

2-mile intervals, each being of sufficient capacity to discharge the total flow of the canal. The wasteways are equipped with a 4 by 5 ft. cast iron slide gate located in a concrete structure alongside the flume. Power for operating the gate is furnished by a 6-hp. hydraulic turbine of the vertical wicket gate type, mounted in an iron case located above the gate. The intake of the turbine is in the curtain wall above the sluice gate in such a position that, when the sluice gate is fully open, the turbine intake opening is covered by it and the supply of water to the turbine shut off. This arrangement serves to automatically stop the turbine when the gate is fully opened. Distant electrical control of the opening of the gate is provided by a magnetic trip mechanism operating to release a small counter weight attached to the turbine gate control shaft. Release of the counter weight serves to open the wicket gates of the turbine and admit water for its operation. A reverse gear set is provided between turbine and gate so that the gate may be closed as well as opened by means of the turbine. The presence of an attendant is necessary for closing the gate and resetting the magnetic release.

Float Switches

Electric float switches or "alarms" are provided for the purpose of closing an electrical circuit whenever an abnormal change in the elevation of the



Interior of the flume showing damage caused by a boulder rolling down the hillside. Float switches are installed along the flume which act as alarms when an obstruction raises the water level.

water surface takes place at any point in the flume. The velocity of flow in the flume is approximately 9 feet per second and the freeboard 9 inches. On account of this high velocity of flow the effect of an obstruction in the flume does not affect the water surface for any great distance upstream. For example: an increase in water depth at any point of 9 inches above normal, which would be sufficient to overflow the flume, will cause an increase of only

about 4 inches in the depth at a point 250 feet upstream and an increase of less than 1 inch at a point 500 feet upstream. It was therefore necessary to place float switches at intervals of about 250 feet in order to insure the operation of one of them in case of an obstruction of the flow at any point that would cause the flume to overflow. Float switches, designed to close upon an increase of the water surface elevation above the normal stage, were therefore installed at 250-foot intervals along the flume. In addition to these so-called "high water alarms" there were provided at intervals of about $\frac{1}{4}$ mile, combination high and low water alarms. The alarm device consists of a galvanized iron tank 6 inches in diameter attached to the side of the flume and connected with it at the bottom by a $\frac{3}{8}$ pipe so that the water stands at the same elevation in the tank that it does in the flume. The tank contains a copper ball attached to a float rod having an electrical contact mechanism at the top. The high water alarms have one ball float and the high and low water alarms have two ball floats separately adjustable for the high and low water elevations at which it is desired to have the alarm operate. The contact mechanism is protected by a cast iron cap and the whole apparatus enclosed in such a manner that it cannot easily be tampered with.

A pole line built alongside the canal carries the necessary line wires for the signal circuits and a telephone circuit. The signal line consists of two number 12 and one number 8 galvanized iron telephone wires carried on telephone insulators. Leads to alarms, wasteways, etc., are of insulated copper wire.

Electrical Equipment

A switchboard is provided at each wasteway and at each of the two patrolmen's houses for the mounting of instruments and switches. Patrol house No. 1 is located at the canal intake and patrol house No. 2 is located about halfway down the canal. Energy for operating the system is supplied by dry batteries. The main signal circuit is operated at a potential of 30 volts supplied from a battery at patrol house No. 1. Signal bells and gate release magnets are operated on secondary circuits by means of relays in the main circuit. An "open circuit" system is used.

The primary functions of the system are as follows. First: when an alarm switch is closed the wasteway adjacent to the point of alarm in an upstream direction is caused to open by the energizing of its magnet release. Second, an alarm bell rings at each of the two patrol houses and a wasteway indicator shows which wasteway has opened. Third: the signal circuits are interlocked in such a manner that no additional wasteways will open until the one already open has been closed again and normal conditions of flow in the canal have been restored. This provision is necessary because, whenever one wasteway is opened, the flow of water in that part of the canal downstream from it of course ceases as soon as sufficient time has elapsed for the water then in the canal to run out. As low water alarms are located at $\frac{1}{4}$ -mile intervals over the entire distance, the contacts of these alarms are closed consecutively as the water drops and the wasteways controlled by

them would in turn be opened if no provision was made to interrupt the connecting electrical circuits. The alarms are connected in divisions, the division points being the 5 wasteways. Each division of alarms is connected to the adjacent wasteway upstream and serves to operate that wasteway only.

The instruments used are of stock construction. The relays are the ordinary telegraph type with 200-ohm magnet coils. The spillway indicators were improvised from voltmeters having 0-15 volt scales. Scales marked with the numbers of the wasteways were substituted for the original scales on the instruments. The indicators are connected across the terminals of the 200-ohm coils of the relays, the coils serving as a shunt resistance. Their principle of operation is based upon the fact that a different voltage is impressed upon the relay magnet for each wasteway that operates because of the different line resistance that is included in the circuit. Resistance coils at the various wasteways are also included in the circuit for the purpose of further increasing the external difference of potential and so adjusting the total resistance of the circuit that the several positions of the indicator pointer for the different wasteways will space up equally on the indicator scale.

A telephone type lightning arrestor is provided at each wasteway and patrol house.

A so-called "gate switch" is a part of the gate operating mechanism at each wasteway. This switch is a single pole double throw switch mechanically connected to the gate in such a manner that it is thrown from one contact to the other when the gate opens. Its operation serves to interlock the circuit to prevent the opening of other spillways as previously noted and also to bring into operation the patrolman's alarm bells and spillway indicators.

In addition to the instruments required for the regular operation of the system, there are also provided voltmeters and push buttons for testing the system for broken wires or connections and for grounds.

The system was placed in operation in 1911 and was used continuously for several years thereafter. During the last three years an enlargement of the canal has been made. The work of enlargement necessitated removal of the float switches and after its completion only a part of them were replaced because after the canal had been in use for a few years excavated slopes become more stable and danger from earth slides and rolling rocks practically ceased.

Among items of particular interest in the December 1st issue of the Journal of Electricity will be the use of the method electrical in the lumber industry, together with a number of technical features of special importance to engineers.

The New Physics

BY A. C. CREHORE

(The elimination of several hitherto unknown quantities in electrical formulæ provides a foundation for the understanding of certain aspects of electricity which have hitherto been untouched. Dr. A. C. Crehore, the author of this important series of articles which begins with this issue, has a world-wide reputation as a creative scientist in the electrical field.—The Editor.)

In the early study of electricity and magnetism, observations of a great variety of phenomena were made, but at that time they seemed to have no evident connection with one another. When a stick of ebonite is rubbed with flannel the stick becomes electrified and is capable of attracting bits of paper presented to it. When a steel magnet is brought near iron filings they are attracted by the steel, but the bits of paper are not affected by the steel. Neither are the iron filings affected by the electrified rod of ebonite, while the paper is. It cannot be said that electrical science began until some method was discovered by which these varied phenomena could be measured. To do this meant that some kind of law governing the phenomena must first be discovered. We owe to Coulomb (1784) our earliest knowledge of the quantitative laws of electric attraction and repulsion. The result established by the investigations of Coulomb may be thus stated. If two spherical bodies are given fixed charges of electricity there results an attraction between them when the charges have a different sign, and a repulsion when they have the same sign. Denoting this repulsion by unity, when the distance between the centers of the two spheres is x , say, he proved that the repulsion is $1/4$ th when the distance is increased to $2x$, $1/9$ th when increased to $3x$, etc., without changing the amount of either electrical charge.

Variations in Mutual Force

And, again, by using metallic spheres, so that the electricity could flow from place to place without obstruction, he found that he could divide the charge that one of the spheres contained into two equal parts simply by bringing into contact with the charged sphere an uncharged sphere of the same radius. The electrical charge of the one then flows over them both, and from the geometrical symmetry it can be seen that when they are separated again each sphere will be equally charged, and each must then contain one-half of the original charge of the first sphere. Dividing the charge in this manner it was observed that the force of repulsion was also divided by two each time without changing at all the distance between the centers of the two spheres. The same thing also applies to the other sphere. When the charge on each was divided by two the force was observed to become one-quarter of its original value. These results may be stated in words as follows: The force which is mutually exerted between two electrified spheres at some distance apart as compared with their radii is directly proportional to the product of their electrifications and inversely proportional to the square of the distance between their centers. When one quantity is proportional to another, it is equal to the other quantity multiplied by some constant. The law thus established becomes

$$F = C \frac{e_1 e_2}{r^2},$$

where C denotes some constant, e_1 and e_2 the values of the two charges, and r the distance between the centers of the two spheres. But this is not the whole of the law, for it was also found that the force exerted by one charge on the other might be changed in another way without changing either the distance between the centers of the spheres or the amount of charge on either one of them. This could be done simply by inserting between the two spheres a piece of uncharged glass, hard rubber or other material. The effect of this was to reduce the value of the force of repulsion as compared with the force when simply air was present between them. The amount of the reduction of the force depended entirely upon the kind of material inserted between the spheres, and one could tell after a little experience what kind of material it was that was introduced without seeing the material at all, but by observing the change in the value of the force. As a result of this observation a certain number had to be multiplied into the denominator of the equation above given according to the character of the substance in which the two spheres were placed while conducting the experiment, and this number has been called the specific inductive capacity of the medium because it depends upon the kind of medium only and upon nothing else. It is denoted by the letter k , and the complete law that Coulomb found may be expressed:

$$F = C \frac{e_1 e_2}{k r^2},$$

It is found that k has its minimum value in vacuo. It is just a trifle larger for air but is several times larger for glass and gutta serena.

Electrostatic System of Units

Some such law as this had to be discovered before there was any way by which quantities of electricity could be measured. Assuming that the above is a true relation between the quantities concerned, it is to be observed that there are four kinds of quantities in it,—force, distance, specific inductive capacity, and electrical charge. Only two of these had ever been measured before, force and distance in terms of the centimeter, gram, and the second as units of length, mass and of time. The other two, specific inductive capacity and electrical charge, we seek to obtain from this single equation. But in the nature of things two independent equations are required to obtain the independent values of two unknown quantities. There never has been, however, any other equation than this, and men have been compelled to build up a system of units based upon this one equation, and known as the electrostatic system of units, by a sort of subterfuge as it were,

in which it has been assumed that the specific inductive capacity, k , is numerically equal to unity for a vacuum, and that we are unable to express the unit of specific inductive capacity in terms of length, mass, and time, as force is expressed. This necessarily means that we are also unable to express the other unknown quantity, electrical charge in terms of length, mass and time as force is expressed, because the arbitrary assumption in regard to k must always be reckoned with as unknown.

Units of Force and Electrical Charge

If, now, it is desired to define the unit of electrical charge by means of the above relation, it may be agreed that there is one unit of electrical charge on each sphere when the distance between the centers of the two spheres, r , is one centimeter, and when the force of repulsion between them is one dyne, the two charges being equal to each other. If the specific inductive capacity, k , is also considered to be unity, this makes all of the quantities in the equation numerically equal to unity except the numeric C . Hence, C must be unity in order that it shall be a true equation. With this definition of the unit, therefore, the constant C may be suppressed, giving simply

$$F = \frac{e_1 e_2}{k r^2}$$

If e_1 and e_2 are equal to each other, this may be written

$$e^2 = k F r^2$$

The unit of force, the dyne, is defined as that force which will produce when continuously applied to one gram of matter a uniform acceleration of it equal to one centimeter per second per second. This definition comes from the known law connecting force with mass and acceleration, namely

$$F = m a,$$

where m is the mass in grams, and a the acceleration in centimeters per second per second. By making both m and a unity in this, F becomes a unit of force. The reason for saying per second per second in referring to acceleration is that the time comes in twice, since acceleration is the rate of change of a velocity. The time comes in once in saying the rate of change, and again in saying velocity because velocity is equal to a distance divided by time. Now, a velocity may be formally expressed by the symbols L/T or $L T^{-1}$, where L may denote any length, and T any time. And, an acceleration requires that the velocity be divided again by a time, and so may formally be expressed by the symbols L/T^2 or $L T^{-2}$, L denoting any length and T any time as before. According to the last equation above force will be obtained by multiplying this acceleration by a mass, and it may formally be expressed by the symbols

$$F = L M T^{-2}.$$

No matter what the values of these lengths, masses or times are, as denoted by these symbols, it will always be found that the quantity obtained by multiplying them together in this particular combination will possess all of the qualities of a force.

In a similar fashion every one of the units employed in mechanics, mass, momentum, moment of momentum, force, energy, etc., are capable of being expressed in the symbols L , M and T , and every different kind of unit combines these three symbols in a different way, so that, if we knew what the combination of symbols is, we would also know the nature of the quantity expressed by them. The combinations of symbols above described are ordinarily called the dimensions of the unit or of the quantity, and they are very useful because the combination is fixed for each different kind of unit. When any uncertainty arises as to the kind of quantity which results from a combination of several different kinds of quantities measured by different kinds of units, the matter may easily be decided by writing out the dimensional formula, a procedure which often prevents error.

Let us now return to the expression for the square of electrical charge as given above. The dimensional formula for it is evidently that of a force multiplied by the square of a length and by the unknown quantity, k , giving as a result

$$e^2 = L^3 M T^{-2} k$$

And, taking the square root, the dimensions of e become

$$e = L^{3/2} M^{1/2} T^{-1} k^{1/2}$$

These are the dimensions of quantity of electricity which will be found in all of the current tables of dimensions of electrical units in the so-called electrostatic system of units. The presence of the unknown quantity k is required in every one of these units, and it is required because the true nature of k has never been revealed in terms of L , M and T by any other fundamental equation like that established by Coulomb. It may be stated in advance of the proper place that the author has found another fundamental equation, which, combined with this equation of Coulomb, makes it possible to obtain both unknown quantities, e and k , in terms of L , M and T , which thus reveals the true dimensions of e and of k . The result obtained for k is to make it the reciprocal of a velocity, namely $L^{-1} T = T/L$. But this is in advance of the narrative.

Measuring Magnetism

At the same time that this law of action between two charges of electricity was found Coulomb also established a similar law of action between two magnetic poles. This may be briefly stated as follows. The force exerted between two magnetic poles at the same distance is directly proportional to the product of the strengths of the poles. And also, the force exerted between two magnetic poles of the same strength but at different distances, is inversely proportional to the squares of the distances. These statements are both included in the formula

$$F = C \frac{m_1 m_2}{r^2}$$

where C is some constant, a numeric, and m_1 and m_2 represent the strengths of the poles, and r the distance between them.

Here again it was found that it was not sufficient to define quantity of magnetism by means of this equation alone, because without changing the distance between the poles or the strengths of them the force exerted by the one upon the other might be altered simply by changing the medium in which the poles were immersed. So an unknown quantity, μ , had to be introduced into the formula. In vacuo the force is a maximum and very nearly the same as in air. So the multiplier, μ , is placed in the equation as was the k in the electrostatic equation, giving

$$F = C \frac{m_1 m_2}{\mu r^2}$$

There are, as before, four different kinds of quantities concerned in this equation, force, distance, quantity of magnetism, and magnetic permeability, and only two of these have ever been measured or defined before, force and distance. The other two, magnetic permeability and quantity of magnetism, we seek to define by means of this equation. It has in a similar manner been customary to call the magnetic permeability of a vacuum unity and define the unit of quantity of magnetism by taking the distance, r , between the poles unity, and the force unity, whence the constant C must also be unity in order that this may be a true equation, giving

$$F = \frac{m_1 m_2}{\mu r^2}$$

If m_1 and m_2 are equal to each other, this may be written

$$m^2 = F r^2 \mu$$

The dimensions of quantity of magnetism are then found from this, as shown, giving

$$m^2 = L^3 M T^{-2} \mu$$

Except for the change from k to μ these dimensions are precisely the same as those of quantity of electricity on the electrostatic system above given. But, since the dimensions of k and of μ were unknown, there was no means of knowing whether quantity of magnetism and quantity of electricity are the same kinds of quantities or not. In other words the dimensional formulae for electrical and magnetic quantities are robbed of their power of identifying the precise kind of quantity being dealt with until both k and μ are known. We had become so accustomed to relying upon the dimensions of mechanical quantities to determine the kind of quantity without question that it was disconcerting to be compelled to give up this useful tool, and to build up two parallel systems of units, one electrostatic and one electromagnetic unit for every kind of electrical and magnetic quantity. It may be stated in advance of the proper place again that the author has found the dimensions of μ as well as those of k above mentioned, for one of them is automatically determined as soon as the other becomes known, as we shall presently see. The result is that k and μ each have the same dimensions in terms of length and time, namely the reciprocal of a velocity. According to this, quantity of electrical charge and quantity of magnetism are precisely the same in dimensions, and

represent precisely the same kinds of quantities. But this is again in advance of the narrative.

The fundamental conceptions and laws that have led to the establishment of two very different systems of units, the so-called electrostatic system, and the electromagnetic system, with which every student of electricity and magnetism is familiar, because they are now in everyday use, have been outlined above.

Technical Hints

BY LOUIS ETSHOKIN

(The reason why certain types of motors are good for variable loads, whereas others are best adapted to constant current demands is here made clear. This is the second of a series of articles on the theory back of practical problems as they are encountered in the field. The author is electrical engineer with the Halcon Radio Company.—The Editor.)

GOVERNING OF ELECTRICAL MACHINERY

One of the numerous advantages of electrical machinery is the fact that it is self-governing. On a gas engine or a steam engine or an air motor, or a hydraulic motor, an essential and often a very expensive part of the machine is a governor. On these machines, when the load goes off, the supply of power continues until checked by the governing apparatus, and if something happens to the governing apparatus, the machine will run at bursting speed.

On the other hand, an electric motor, or a transformer will adjust the amount of current it consumes



Fig. 1

The more work a synchronous motor is called upon to do, the more current it will draw, since the back voltage generated by the motor is equal and opposite to the applied voltage, and no IR drop is available.

to the amount of load it is carrying. The exception to this rule is the series motor. If we attempt to use the series motor for constant speed work, we will find that the governing mechanism does not work that way.

If we use the series motor where we want constant power, however, we have an ideal driving unit. A series motor does automatically what you do for the gas engine in an automobile when you shift gears. You come to a hill with your automobile. Immediately you shift gears so that your gas engine can make more turns for each turn of your wheels. The net result is, that your wheels go slower.

But a series motor would do this automatically. Try to make a series motor do more work and it will do it, but less rapidly. Get it to do less work, and it will do it more rapidly. Therefore it is an ideal motor for traction and hoisting work.

A shunt d.c. motor, on the other hand, will keep its speed practically constant whether the load be

light or large. The more load it is given the more current it will pull. How is this brought about?

It all depends on this law. The total voltage impressed on a d.c. motor goes to make up the $I R$ drop in the motor, and to counteract the counter voltage produced by the motor.

So, if our load gets a little larger, the first impulse of the motor is to slow up. Immediately, the counter voltage produced by the motor decreases, and

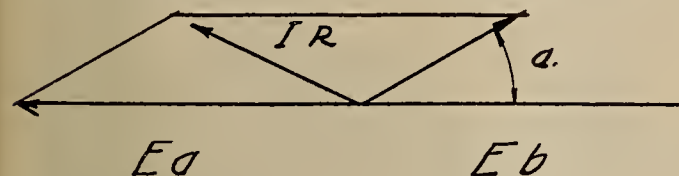


Fig. 2.

The bigger the load the greater the angle a , and the greater the resultant $I R$, and the greater the current.

we have more voltage available for $I R$ drop in the motor. This causes more current to flow, causes more torque to be developed, and a balance is again

set up between the counter voltage and the necessary current. So much for d.c. motors.

How about a.c. motors? A synchronous motor either runs at a certain speed or does not run at all. Up to a load at which it will not work, it will run at a constant speed. The more work it is called upon to do, the more current it will draw; the less work the less current. The reason is as follows:

With no load, the back voltage generated by the motor is equal and opposite to the applied voltage, and no $I R$ drop is available (Fig. 1). But as load goes on, this back voltage, although remaining equal to the applied voltage, does not remain opposite to it, and consequently there is a resultant voltage which makes an $I R$ drop available, and supplies current. The bigger the load the greater the angle a (Fig. 2), and the greater the resultant $I R$, and consequently the greater the current.

In an induction motor the speed varies slightly, due to what is known as slip, between the rotating field and the rotor. The greater the load, the greater the slip and consequently the greater the currents produced in the rotor, and in the stator of the machine.

Electrification of Swiss Railways

BY F. DOSSENBACH

(The electrification of railways is a matter in which the West has taken a very active interest for some time. The similar conditions of extensive water power resources in Switzerland and the development and future plans for electrified railroads in that country are here described by the director of the Official Information Bureau of Switzerland in New York.—The Editor.)

The introduction of electric traction on the lines of the Swiss Federal Railways has in these latter years, on account of the acute shortage of coal occasioned by the war, received the foremost attention of the authorities and has now emerged as a very practical economic question.

Water Power Resources —

The principal nerve of the Swiss railway system is government owned. The electrification of these lines is simplified by the vast store of unused water power which the country possesses. According to an official survey, verified in 1914, including the stowing and improvement of lakes, the water power of Switzerland is capable of producing an energy equal to 2,173,000 horsepower. If old plants were replaced by new ones it is even estimated that the highest efficiency of the total water power reserves could be raised to as much as 8,000,000 horsepower. On January 1, 1914, the electric power already in use in Switzerland amounted to 887,000 horsepower.

First Electric Railways —

The Swiss Confederation owns some 1800 miles of the entire railway system of the country, which covers 3,216 miles. Of the 1,416 miles owned by private companies 622 miles are already electrical, but only an insignificant percentage of the government railroads has so far been operated by electricity.

The first important Federal standard-gauge road to be chosen for electrification was the Gothard Railway, one of the important international highways,

featuring moreover in many sections the brilliantly conceived engineering of mountain railways. The electrification of the 68 miles section Erstfeld-Bellinzona was approved in 1913 and it is expected that it will be opened this Fall. This section, with 28 per cent of its length consisting of tunnels and a grade of 2.5 to 2.7 per cent for 25 miles, was chosen for an experiment because of its enormous traffic with Italy, which caused large consumption of coal with resulting smoke in the tunnels.

Plans for Development —

The sections Bellinzona-Chiasso and Erstfeld-Lucerne are expected to follow in 1921 and the consulting experts have found that the big power stations at Amsteg and Ritom, the first yielding 26,000 horsepower and the latter 32,000 horsepower, will also suffice for these lines, even if the traffic should increase some 60-70 per cent. Another series of plants yielding 70,000 horsepower is planned for eastern and central Switzerland.

The cost of electrification of the Erstfeld-Bellinzona line is estimated at \$8,000,000. The cost of electrifying the entire Federal railway system is estimated roughly at \$200,000,000.

In 1918 the electrification of the following railways using steam traction was decided upon and work on them commenced at once: the sections of the Federal Railroads Sion-Brigue and Berne-Thun; the section Hasle-Langau of the Emmenthal Railroad and the section Bevers-Filisur of the Rhaetian Railroads.

The to-be electrified section Sion-Brigue will be a continuation of the electric traction Simplon tunnel which was opened for traffic in 1906, with its northern exit at Brigue.

Electric Lines Now Operating —

The electrified Berne-Thun line, connecting with the electric Berne-Lotschberg-Simplon railway, which latter was inaugurated in 1913, has already been opened for traffic—in May last. It now provides excellent and frequent train connections between the Swiss capital, the Bernese Oberland resorts and—in connection with the Lotschberg line—the Valais and Northern Italy.

The new locomotives which are being used by the Swiss Federal Railroads on the section Berne-Thun, besides those of the Berne-Lotschberg-Simplon line, are each equipped with four single-phase alternate current motors, each of 450 horse-power. The electric parts were furnished by Brown-Boveri & Company, Baden, and the mechanical parts by the Swiss Locomotive and Machine Company of Winterthur.

The electrification works on the Bevers-Filisur line were completed by the middle of last April, and from April 16 steam engines have been duly replaced by electric motors, the current being supplied by the power station of Bevers, which furnishes the necessary energy for the Engadine lines which were electrified in 1913.

THE RAILWAY AUTOMATIC SUB-STATION

(The service of the automatic substation in power distribution has been found most effective in reducing expenses, as well as very safe in operation. The special automatic features of a recently installed railway sub-station are described here.—The Editor.)

The automatic sub-station recently put into service at the Torrance sub-station of the Pacific Electric Railway Company has proven very successful and some of its automatic features are of exceptional interest.

The sub-station operates entirely automatically and eliminates the necessity of any sub-station operators, which means a direct saving in the railway company's operating expenses.

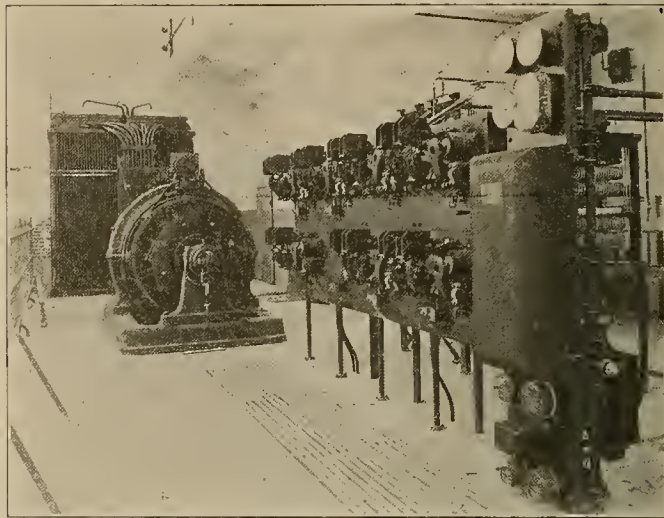
When the trolley voltage drops for two seconds to a predetermined voltage, the station starts up automatically and in from 30 to 40 seconds the rotary is delivering power to the line. When the power demand ceases for a predetermined period (this time can be set at from 3 to 20 minutes) the rotary will shut down automatically. If the incoming a.c. feeder voltage is below a predetermined amount the rotary will not start.

A thermostat is so placed that it will automatically shut down the rotary in case of a sustained overload; however, the station will start again automatically as soon as the thermostat cools down.

The starting switch on the rotary cannot close until all but the pilot brushes are completely raised. The brushes will not lower until the d.c. voltage has built up to full voltage of the right polarity. In case the d.c. voltage comes up wrong polarity, the field is automatically reversed. Should it come up wrong three times in succession, the starting switch auto-

matically opens long enough to allow the rotary to slip a pole, then closes again. This operation will continue until the voltage comes up right.

The d.c. contactors which connect the rotary to the line cannot close until the brushes are all completely down on the commutator.



Automatic sub-station equipment recently put in service at Torrance by the Pacific Electric Railway Company. The equipment, furnished by the Westinghouse Electric & Manufacturing Company, consists of: 1—100-kw. multiple self-starting a.c. converter; 1—10,000-kva., 3-phase, 50-cycle, 16,000-volts oil immersed self-cooled transformer, and 2 switchboards, which take care of all automatic features.

In case of heavy overload, resistance is automatically put into series with the machine. Thermostats automatically shut down the rotary if the overload remains long enough dangerously to heat the resistance. When the resistance cools, the station is ready again to start automatically. An air operated automatic circuit breaker protects the station on the high tension side of the transformer.

A thermostat is placed in each bearing to protect against overheating. An overspeed device is placed in the armature shaft.

The main d.c. contactor has a relay which opens when the contactor has made three successive attempts to close on a short circuit or a grounded line.

In case any one of the above relays opens, the station will, by opening the automatic control circuit, shut down and lock itself out until an inspector visits the station, clears up the trouble, and resets by hand the relay which has tripped.

REVIVING PLANTS WITH ELECTRICITY

Reviving plants with electricity has been the subject of several recent experiments. One of these was tried on a small cactus plant which had been sent from Mexico, and which seemed to pine away rapidly. The cactus appeared to be nearly dead when the experiment was first tried. Two cells of a dry battery were used, the positive pole being connected to a nail placed in the soil of the flower pot, and the negative secured to the upper part of the plant. The cactus brightened up after one week's treatment, and in two weeks was growing nicely. Further experiments were tried on rose and fuchsia bushes with good results. The resistance of a plant is considerable, so that the flow of current is but a fraction of an ampere.

SPARKS—Current Facts, Figures and Fancy

(Plowing, clearing the sea of mines, and cutting coal are some of the newest applications of electricity; iron depositing bacteria, the housing situation in Germany and the telephone service in London are some current troubles which have not been so successfully handled at present, though one solution of the last named would seem to be Egyptian operators.—The Editor.)

Electrical and compressed air coal-cutting machines are shortly to be introduced into some of the coal mines of England, according to recent reports.

* * *

Copper production for the United States during August, 1919, is estimated at 102,000,000 lbs., or about 2 per cent increase over the previous month.

* * *

A regular commercial airplane service was recently instituted between Paris and London, carrying passengers and freight. A regular customs examination such as is given vessels precedes the flight.

* * *

The latest in banking is a deposit of two tons of sugar by a merchant whose storage space is limited. We have been realizing recently that sugar is a priceless commodity but hardly expected to see it competing with gold so undisguisedly.

* * *

Renting cells in the city jail is one of the recent methods of meeting the housing situation in Berlin. But somehow, if there is no greater choice of location than this, it would seem that the prospect of living rent free would be a direct incitement to crime.

* * *

Bacteria have been found to be active agents in the deposition of some beds of iron ore. Iron-depositing bacteria have been found responsible for the rusty masses which occasionally clog water supply pipes, and also for deposits in mine waters at a depth of several hundred feet.

* * *

Electricity is being widely used in clearing the North Sea of mines. Many of the mines are sunk very deep and have antennae which, when touched, cause the mine to explode. Special electric cables several hundred yards long are being used to explode these mines at a safe distance from the boat.

* * *

Transmission of energy by wireless waves is the goal of research now being conducted by a Roumanian engineer. In his experiments he uses a tube filled with liquid in which vibrations of the nature of sound waves are produced at one end and the energy is reconstructed in a mechanical form at the other

* * *

The recent centenary of James Watt brings to mind the fact that in addition to his work in the field of steam engineering, Watt was an able civil engineer, an instrument maker, a philosopher, the originator of the decimal system of weights and measures, and the inventor of a large number of mechanical devices.

Those who are discontented with the American telephone service should make a visit to England where it frequently takes from one to three days to get a long distance call. A caustic subscriber remarked recently that the quickest way to call the fire brigade in London was to send a postcard marked "Urgent."

* * *

A Danish inventor is working on a new invention to develop electrical power direct from the air. Such an invention would be rather a blow to the West, which is wont to rejoice in its superior water-power facilities. Almost any old place can boast of air,—except London, and perhaps the invention will work just as well with fog.

* * *

The longest news telephone line is operated from Chicago to Marquette and Houghton, Mich. The line is 600 miles long and is in operation two hours every night, transmitting during that period approximately 7,000 words of news matter including the scores of baseball games. The receivers type off the message just as it is read to them over the wires.

* * *

Electric plows are being tried out in Italy, and the trials have proved so satisfactory that it is probable electric plowing will become widely used. The cost has been shown to be less than one-third of the cost of the ordinary tractor work, and the fact that most of the fields are small and comparatively flat, and that the necessary power is available in practically every section of the country, makes Italy especially suitable for the experiment.

* * *

Telephone operators in Alexandria, Egypt, must be conversant with at least four languages before being employed, and this in spite of the fact that the average age of these girls is 18 and the joining age 16 years. A recent visitor to Egypt heard successively an Italian, a Greek, a Frenchman, an Egyptian, a Syrian and an Englishman call for numbers, each in his own language, and in no case did the connection take more than fifteen seconds.

* * *

A device to indicate the number of vacant seats in a street car or omnibus has recently been designed by a London man. On a dial indicator, operated by an iron tread on two of the steps, appears a number corresponding to the number of vacant seats. If figure 5 is shown and two persons descend the number automatically changes to 7. If another gets on, the figure 6 appears. We have only one fault to find with this, namely, that we have seen one passenger get out of a street car and leave two vacant seats.

PERSONALS

Herbert J. Flagg has been appointed chief engineer, Public Service Commission of the State of Washington. Dur-

ing the war he served as Captain, Coast Artillery, and for a considerable period he was stationed at Fortress Monroe, Virginia, instructing in the Coast Artillery School there. With the exception of his twenty-one months in the army, Captain Flagg has been with the Public Service Commission, as assistant engineer, since March, 1915. He was graduated from the College of Civil Engineering, University of Washington, in

1912. In the position of chief engineer for the Commission, Captain Flagg succeeds D. F. McCurrach, who resigned to enter private practice, specializing upon appraisal and rate-making lines.

M. C. Henderson, city electrical engineer of Dunedin, New Zealand, is a recent San Francisco visitor.

J. F. Kinder is on an extensive trip in Texas. Mr. Kinder is the Pacific Coast representative of the Ohio Vacuum Cleaner.

F. H. Murphy, illuminating engineer of the Portland Railway Light and Power Company, is in the East attending the Illuminating Engineers' Convention.

W. E. Roberts, ex-deputy city electrical inspector of Portland, Ore., is giving a course on the National Electrical Code at the Benson Polytechnical High School in connection with the night classes.

T. B. Cabell, a prominent salesman with the Electric Supply Company of Memphis, Tenn., is a recent San Francisco and Los Angeles visitor. Mr. Cabell has his business headquarters at Jackson, Miss.

John Barrett, director-general of the Pan-American Union for the last fourteen years, formally offered his resignation at a recent meeting of the governing board of the Union, effective next June 30th.

P. L. Boyer, formerly with the Salt Lake Hardware Company, has accepted a position with the Economy Fuse Manufacturing Company. He will cover the inter-mountain states and have headquarters at Salt Lake City.

J. H. Deppeler of the Metal & Thermo Corporation has been elected a vice-president of the American Welding Society, and P. F. Willis, president of the Henderson-Willis Welding & Cutting Company, has been elected a director of the Society.

M. J. Verdery, sales representative of the Edison Electric Appliance Company and chairman of the Salesmen's Auxiliary of the California Electrical Cooperative Campaign, has returned to San Francisco from a successful trip through Southern California.

O. T. McLean, who has been connected with the Northwest Utilities Company, has resigned, his resignation taking effect October 31. He will devote his entire attention to the Electric Service Company of Mankata, Minn., of which he is secretary and treasurer.

A. B. West, general manager, and E. B. Criddle, general agent of the Southern Sierras Power Company with headquarters at Riverside, are recent San Francisco visitors. Mr. Criddle has returned to Riverside, while Mr. West is spending some time on a vacation duck hunting trip in Utah.

W. H. Onken, Jr., editor of the Electrical World, has been an interested Pacific Coast visitor in recent weeks. He has addressed a number of electrical gatherings and has been assisting R. H. Ballard very materially in his efforts to form strong geographic sections throughout the country and also to further the company section membership in the National Association.

W. F. Durand, professor of mechanical engineering at Stanford University, who is serving as chairman of the San Francisco Section, A. S. M. E., has just completed a very interesting report on research statistics connected with activities of local mechanical engineers which has been forwarded to New York for consideration by the Research Committee of the Society.

M. H. Aylesworth has been appointed executive assistant to the president of the National Electric Light Association. For four years Mr. Aylesworth was chairman of the Colorado Public Utilities Commission, and recently was assistant to the vice-president and general manager of the Utah Power & Light Company, Utah Light & Traction Company, and Western Colorado Power Company, being in charge of public relations and public policy.

P. A. Roelofsen, a noted engineer of the Dutch East Indies, who is head of the Bureau for Waterpower and Electricity with headquarters at Bandoeng, Java, is a recent San Francisco visitor. Mr. Roelofsen is making a tour of the United States in the interest of railway electrification and nitrogen manufacture. He is accompanied by Walter Blaser, a prominent canal engineer of Java. They both expect to be back again in Java in about six months.

Wm. H. Snow, general manager, and R. H. Barber, chief engineer of the New Bedford Gas & Edison Light Company with headquarters at New Bedford, Mass., are both recent San Francisco and Los Angeles visitors. They are making a study of fuel oil installation with a view toward using this type of steam electric generation in their New Bedford installation. Mr. Snow and Mr. E. C. Jones, chief gas engineer of the Pacific Gas & Electric Company, entered the gas business together in 1881 back in Boston.

W. H. Easton of the Westinghouse Electric & Manufacturing Company with headquarters in New York City, has returned to his home city after a recent interesting visit to the Northwest. At the Seattle convention of the Northwest Electric Light and Power Association Mr. Easton delivered an interesting and instructive lecture on the uses of electricity featured by lantern slides and moving pictures. The subject of railway electrification, now of such vital interest to the economic welfare of the nation, was well brought out and enjoyed by all.

Roy J. Heffner, formerly captain in the Radio Branch of the Aircraft Service, has become associated with the extension division of the University of California and will have charge of technical instruction, to succeed H. H. Bliss, who will in future devote his entire energies to teaching work in the extension division.

Mr. Heffner, fresh from executive duties in the military service where he had much to do with the organization of the aeronautic school at Berkeley, California, during the war period, comes to the new position

brim full of new ideas of helpfulness, especially looking toward the extending of university courses to engineers not in residence at the University who desire to pursue further study. His field is a big one and much is expected of him. Strength to his strong right arm.



Lester S. Ready has been appointed assistant chief engineer of the California State Railroad Commission. Mr. Ready has been with the Commission for some years, as gas and electrical engineer. Previously he was with the distribution department of the Pacific Gas & Electric Company, San Francisco. He was graduated in 1912 from the University of California, College of Mechanics, and had the high honor of winning the University Medal, awarded each year to the most distinguished member of the graduating class. Mr. Ready's



high intellectual ability as well as his extensive training and practical experience make him especially well qualified for his important new position.

Yone Nogachi, professor in Tokyo University, Japan, is at present visiting San Francisco.

F. D. Nims of the Northwest Electric & Waterworks, Seattle, is on a business trip through the East.

S. B. Anderson, treasurer of the Pacific States Electric Company, San Francisco, recently visited the Seattle branch of the concern.

Captain R. W. A. Brewer, construction engineer, is making a business tour during which he will visit New York City and other Eastern points.

A. W. Ambrose, petroleum technologist, of the Bureau of Mines at Bartlesville, Oklahoma, is visiting the San Francisco office and Pacific Coast oil fields.

W. E. Jones, district sales manager of the Economy Fuse Manufacturing Company, 935 Henry Building, Seattle, is visiting the Salt Lake offices of the company.

C. E. Grunsky, consulting engineer of San Francisco, and Capt. C. E. Grunsky, Jr., have returned to the Pacific Coast after an extended engineering trip in Maine and the Eastern states.

A. A. Hammer, petroleum technologist, of the U. S. Bureau of Mines and in charge of the Bureau's office at Wichita Falls, Texas, is in California reviewing conditions in the Pacific Coast oil fields.

A. W. Leonard, president of the Puget Sound Traction Light & Power Company, and D. C. Barnes, manager of the Seattle properties of the company, have returned from a month's trip to California.

A. Lincoln Fellows, U. S. Government engineer, has been transferred from the Kern County District Irrigation Board which he has been serving for the last four months to the Madera Irrigation District.

H. J. Billaca, formerly with the Washington Water Power Company of Spokane, Wash., has joined the forces of the Western Electric Company in San Francisco, and is in charge of the Thomas Insulators.

Captain W. B. Mel, formerly valuation engineer for the Pacific Gas & Electric Company, has left for the Hawaiian Islands where he will be engaged in commercial and engineering phases of the fruit canning business.

Chas. Heston Peirson, publicity agent for the Southern California Edison Company, was one of those in attendance at the recent San Francisco banquet given in the interests of the California Electrical Cooperative Campaign.

J. T. Holmes, electrical engineer for the Pacific Marine & Construction Company with headquarters at San Diego, is a recent San Francisco visitor. Mr. Holmes' company has in charge the construction of several concrete ships at San Diego.

C. P. Bowie, petroleum engineer for the U. S. Bureau of Mines, in charge of the San Francisco office of the Bureau, returned to his headquarters after an extended trip through the Eastern and Mid-Continent fields reviewing oil-field activities.

F. M. Kerr, vice-president and general manager of the Montana Power Company, has been appointed by President Ballard as chairman of the Committee on Electrification of Steam Railroads for the convention of the National Electric Light Association.

H. A. Petterson, professor of hydraulic and sanitary engineering at the Pei Young University of Tientsin, China, has returned to China after spending several months in California where he was formerly engaged as a civil engineer on the Los Angeles Aqueduct.

Robert Sibley, editor of the Journal of Electricity, leaves in a few days for New York City to take part in conferences at the headquarters of the McGraw-Hill Company. Mrs. Sibley is to join him in New York. They plan to return to California before the Christmas holidays.

A. J. Frey, district manager of the U. S. Shipping Board, Southern Pacific District, with headquarters in San Francisco, resigns his position the first of the year. J. L. Ackerson, vice-president of the board with headquarters at Philadelphia, has not as yet announced Mr. Frey's successor.

R. F. Oakes, general manager of the National Carbon Company, headquarters in San Francisco, was a recent Seattle visitor. He had just returned from an extended trip to the eastern zone offices of the company in New York, and was on his way home. He visited the branch offices at Spokane, Seattle and Portland.

C. D. Slaughter of the Allied Industries, Inc., San Francisco, Los Angeles and Seattle, left San Francisco October 27th to visit the manufacturers of electrical materials which this company represents on the Pacific Coast, in the interest of closer cooperation between these factories and themselves, so that Pacific Coast requirements may have closer attention.

John A. Britton, Jr., who recently returned from an extensive business tour of the Orient, on November 12 addressed the Foreign Trade Club of San Francisco, telling his experiences in China, Japan, Siberia, the Philippines, and other lands of the Far East. Before entering the world trade field, Mr. Britton was with the Pacific Gas & Electric Company, as manager of the gas department in Oakland.

C. P. Deming, manager of the Seattle office, National India Rubber Company, recently visited the eastern Oregon and southern Idaho sections. He was at Baker and Pendleton, Oregon, and Twin Falls and Pocatello, Idaho. He reports considerable extension work being done by the Eastern Oregon Light & Power Company in the vicinity of Baker, including extensions to the mining section. The Idaho Light & Power Company is also active on extension work.

R. H. Ballard, president of the National Electric Light Association, and vice-president of the Southern California Edison Company, is coming to San Francisco to attend the Get-Together Dinner of the California Electrical Cooperative Campaign, Saturday evening, November 15th. A. E. Wishon, president of the Pacific Coast Section, N. E. L. A., and assistant general manager of the San Joaquin Light & Power Corporation, also plans to attend the banquet. A. C. Balch, vice-president of the same company, likewise is to be present.

OBITUARY

W. D. Weaver, former editor of Electrical World, died of heart failure at his home in Charlottesville, Va., Nov. 2, 1919. Mr. Weaver was widely known in the electrical industry throughout the nation and his loss will be sadly mourned.

R. W. Mackie of the sales department of the Western Electric Company, died on October 27th of typhoid fever.

Meeting Notices for Electrical Men

(The Southwest is prominent in this week's activities with two important meetings—the gathering in honor of Mr. Ballard, and the lamp agents' conference, both held in Los Angeles. Fresno was the scene of a very interesting meeting of the California Electrical Cooperative Campaign committees, and contractor-dealer organizations in the Northwest are consistently active.—The Editor.)

Oregon Association of Electrical Contractors and Dealers

The state executive committee of the Oregon Association of Electrical Contractors and Dealers met at Hood River, Oregon, October 17, 1919. Those present were: Roy Kenney, John Tomlinson, E. S. Colby and H. C. Jones. The application of The Dalles Electric Company of The Dalles, Oregon, was accepted. The secretary reported that Mr. H. William Herkstroter, representing the Industrial Finance Corporation of New York, had completed arrangements with the U. S. National Bank of Portland for handling the Morris Plan trade acceptances. The committee held on record as approving the plan of operation and the secretary was instructed to assist the U. S. National Bank in conveying to the members of the association information regarding the working of the Morris Plan.

A letter from Mr. O. B. Coldwell, Northwest Electric Light and Power Association, was read. It was suggested that the Oregon Association of Electrical Contractors and Dealers assist them in co-operation along various lines, and the association was asked to secure large attendance of its members at the national convention of the N. E. L. A. to be held in Pasadena next year. The committee went on record as favoring any bond of cooperation that may be devised between the two organizations and will start a campaign early in 1920 to insure a good attendance of its members at the Pasadena convention. Mr. Roy C. Kenney was appointed as division executive committeeman. The appointment of H. C. Jones as state secretary was confirmed.

American Association of Engineers

A new local chapter of the American Association of Engineers is being organized at the Oregon Agricultural College at Corvallis, Oregon. They expect to have 600 members. Student members enjoy all the rights and privileges of regular members—except the right to vote. Dues are \$3.00 per annum, with no initiation fee. The local chapters elect their own officers and govern themselves in all matters as regards local policies, etc., curbed only by constitutional limitations. Mr. R. W. Barnes recently went to Corvallis to help them with their organization.

Electrical Cooperative League Dinner in Honor of R. H. Ballard

His associates in the Southern California electrical world gathered at the Alexandria, Los Angeles, on October 29th,

to welcome home R. H. Ballard, president of the National Electric Light Association. The dinner was in recognition of the securing by Mr. Ballard of the next convention of the association for Pasadena, where it will meet May 18 to 21, 1920.

A. Emory Wishon, president of the Pacific Coast section of the National Electric Light Association, took up his duties as toastmaster of the dinner after being introduced by Ralph B. Clapp, president of the Electrical Cooperative League, under the auspices of which the dinner was held. Mr. Wishon called upon John Willis Baer, as representing the chairman of the Pasadena city commission, and Dr. Baer extended the hearty welcome of the city to the convention and told of the pleasure it would be to the people of Pasadena to have so great a gathering meet in their city.

The guest of the evening, "Russ" Ballard, told his hearers of the way Eastern capital and business were beginning to regard California. With especial regard to the electrical industry and the coming of the convention he said:

"California is the center of interest in the electrical industry, with its western spirit of confidence, optimism, courage and audacity, its great power developments, wonderful possibilities and expanding market for the power as developed.

"Money to finance these projects must come largely from the East, attracted by sound financial conditions, the result of satisfactory returns to investors from payments by contented consumers.

"Eastern operators and investment bankers attending the national convention at Pasadena next May will gain intimate knowledge of Western conditions, and water power development and steam railroad electrification will be features of the convention.

"Two hundred and fifty million dollars can be used to advantage in electrical developments in California in the next ten years, half of which would be spent in the state for wages, raw materials and manufactured products. Large manufacturing industries would be attracted, thousands of acres of land irrigated, hundreds of thousands of homes electrically equipped from cellar to garret, making labor more productive and helping to solve the servant problem."

Other speakers were Ben M. Maddox, vice-president of the Mt. Whitney Power & Electric Company; William Baurhyte, first vice-president of the Los Angeles Gas & Electric Company; Glenn Arbogast, president of the Dealers and Con-

BUILDERS OF THE WEST — LXV



AURELIA H. REINHARDT

It is fitting in this issue of the Journal of Electricity, devoted in large measure to problems of lightening the labor in the home, that we pause in the technical discussion of problems of electrical application to voice the profound respect and admiration of this great industry in the West for those who have a vital part in rearing and educating the future housewives of America. To Aurelia H. Reinhardt, president of Mills College, devoted mother of two children and kindly godmother to ever increasing hundreds of young womanhood, this issue of the Journal of Electricity is affectionately dedicated in lasting appreciation of her ideals of responsibility in citizenship and in the home she is inculcating among the young women of America.



The Welcome-Ballard-Home dinner held in Los Angeles on October 29 was one of the best attended gatherings of the season. A number of able and prominent speakers and a well-rounded entertainment program made the meeting pass off with the greatest success.

tractors' Association; K. E. Van Kuran of the Advisory Committee of the California Electrical Cooperative Campaign; Charles Heston Pierson, publicity manager of the convention; William H. Onken, Jr., editor of the *Electrical World*, and E. B. Criddle, general agent of the Southern Sierras Company.

San Francisco Electrical Development League

At the October 27th meeting of the San Francisco Electrical Development League, Charles F. Newsom, division commercial manager of the Western Union Telegraph Company, spoke on the possibilities of improving business by employing the telegram. He pointed out that by use of telegrams, instead of letters, any business firm could gain 100 additional opportunities during the next year. After his talk, Mr. Newsom answered questions submitted to him by the members. Joseph Mulvihill, of the San Francisco Board of Supervisors, was a guest of the meeting and spoke a few cordial words in reference to electrical development.

The luncheon meeting of November 3rd was addressed by W. H. Onken, Jr., editor of the *Electrical World*. Mr. Onken's speech, on "The Value of Publicity to the Electrical Industry," is reproduced elsewhere in this issue. John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, acted as chairman of the day, and in introducing the speaker he paid a tribute to the services of the technical press in the upbuilding of the industry.

Electrical Contractors and Dealers' Association of San Francisco

Regular meetings of the San Francisco association, held on October 31st and November 7th, were taken up mainly with discussion of practical policies of the association. At the latter session W. D. Kohlwey, chairman of the retail section, announced that the retailers have perfected permanent organization, with a membership approaching forty. M. A. DeLew urged all members to attend the California Electrical Cooperative Campaign dinner on November 15th in San Francisco.

H. H. Courtright, of the Valley Electric Company, Fresno, who was a visitor at the meeting, spoke on the satisfactory condition of the industry in Fresno and vicinity.

National Electric Light Association

An important item in N. E. L. A. affairs is the work of the special committee on Geographic Sections, under the direction of Vice-President M. R. Bump. This committee recently submitted a tentative layout dividing the country into twelve Geographic Sections. An active campaign is now being carried on with prominent members in each proposed section in order that this work may be consummated by the time of the Pasadena convention.

The committees of the National Special Sections are all actively at work, no less than fifteen committee meetings

being held during October, and a large number of future meetings are already scheduled, reaching into February, 1920.

Chairman Birch of the Company Sections Committee reports unusual activities along this line, a number of the older Sections getting down to a pre-war basis and many new Sections being organized. Reports on a number of these will appear in the next issue of the *Bulletin*.

LOS ANGELES LAMP AGENTS' CONFERENCE

A meeting of Edison lamp agents and local agents of the Southern California Edison Company was held at the Jonathan Club, Los Angeles, October 28. The meeting was called to order by J. O. Case, local manager supply department, General Electric Company, who talked on "Self-Interest" and the possibilities for the electrical contractor-dealer and lamp agent. He introduced C. E. Spaulding, local manager of the Edison Lamp Works, who acted as chairman. Mr. Spaulding talked on Sales Helps, such as the advertising material which the Edison Lamp Works offer their agents.

F. D. Fagan, district sales manager, Edison Lamp Works, talked on the aims and objects of the meeting. He brought out the importance of getting together and exchanging ideas for increasing the incandescent lamp business, and also dwelt on the importance of a standard of better illumination, both for the industrial and the home.

W. L. Frost, assistant general agent of the Southern California Edison Company at Los Angeles, chose the subject, "What the Central Station Expects of the Lamp Agents." Mr. Frost's interesting talk brought out the importance of agents selling the proper voltage lamp for the circuit. At the conclusion of this address there was considerable discussion on the voltage question, which resulted in the jobbers and manufacturers deciding to standardize on 110 volts as the proper voltage lamp to be supplied on the circuits of the Southern California Edison Company. Mr. Frost also pointed out the fact that even though the Southern California Edison Company had discontinued giving free renewals, they were still receiving orders for large quantities of Mazda lamps, which business he would be glad to see go to the lamp agents. At the close of Mr. Frost's talk, Mr. Fagan made the statement that there was no question but that the management of all of the electrical dealer-contractors and lamp agents of Southern California appreciated the cooperation of the Southern California Edison Company and realized what their change of policy from free renewals to selling Mazda lamps at list prices meant to the dealer, but called to the attention of those present that possibly the clerk, the salesman or saleswoman in the agents' stores did not appreciate the assistance the central station had been to the dealer, and urged the managements to impress this point upon their employees. When a complaint from the central station cus-

tomer was made against the central station, he said, the lamp agent's representative ought to take the part of the central station and endeavor to convince the customer that the central station was willing and ready to do the right thing by the customer and give him the very best service possible; and if they considered it important enough, to call the central station's attention to the particular customer's complaint so that they might rectify any mistake or misunderstanding.

F. J. Airey of the Pacific States Electric Company talked on the subject of the agents tying-in local advertising in newspapers, show windows and other mediums, with the national magazine advertising done by the manufacturers.

A sales demonstration, showing the correct and incorrect methods of selling, was put on by F. D. Fagan and C. E. Cayot of the Edison Lamp Works.

At the close of the meeting an informal dinner was served in the dining room of the Jonathan Club.

A. S. M. E., San Francisco Section

An important meeting of the San Francisco Section, American Society of Mechanical Engineers, was held at the Engineers' Club in San Francisco on October 30, 1919. Two interesting papers were presented, "Flow of Oil Pipe Lines" by Dr. Wm. F. Durand, and "Pipe Line Design and Economics" by H. W. Crozier.

California Electrical Cooperative Campaign Committees

An unusually helpful and enjoyable meeting of the Advisory Committee of the California Electrical Cooperative Campaign was held at Fresno and at Crane Valley Dam on



After the meeting of the California Electrical Cooperative Campaign at the Crane Valley Dam, the members of the Advisory Committee and their guests were shown over the new work of the San Joaquin Light & Power Corporation. Real thrills were experienced as the men were lowered down 2000 ft. into the canyon where the Kerckhoff dam is being constructed in record-breaking time. In the view from left to right are: I. W. Alexander, R. M. Alvord, H. R. Noack, Capt. Howard Angus, M. L. Scohey, P. M. Downing, M. A. DeLew, R. C. Starr, Glenn E. Arbogast, with A. Emory Wishon shown seated on the right.

November 25th and 26th, 1919. There were present at the meeting the following:

M. L. Scohey, G. B. McLean, E. B. Walthall, H. H. Hughes, A. W. Childs, L. H. Newbert, Harry Noack, L. I. Quinn, I. W. Alexander, Mr. Nickson, D. E. Harris, W. M. Deming, G. R. Kenny, Robert Sibley, J. J. Gibson, J. E. Cleary, H. H. Courtright, A. E. Wishon, C. D. Lamoree, Howard Angus, M. E. Newlin, M. A. DeLew, A. E. Wishon, Carl Heise, J. E. Johnston, G. E. Arbogast, and R. M. Alvord.

At Crane Valley Dam the entire committee was entertained most royally by the San Joaquin Light & Power Corporation. A barbecue dinner on Saturday night and a chicken breakfast on Sunday morning served to brighten the hearts and stomachs of all those taking part in this interesting work.

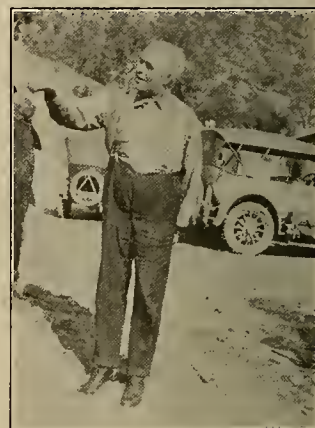
After the morning session Sunday morning, the committee as a whole was taken over the new work of the San Joaquin Light & Power Corporation, including the building of the giant Kerckhoff Dam. Needless to say the courtesies of the San Joaquin Light & Power Corporation were enjoyed to the fullest extent, and the members of the committee were loud in their praises of the very efficient work that is now



Just to give an exciting pose A. Emory Wishon, assistant general manager of the San Joaquin Light & Power Corporation, and Robert Sibley, editor of the Journal of Electricity, were sent out over a hazardous aerial trolley ride above the San Joaquin River at the Kerckhoff Dam.

being undertaken by the San Joaquin Light & Power Corporation in its efforts to deliver additional power service to its consumers who are now crying by the hundreds for more power supply.

An unusual and rare treat was enjoyed by the committee members in the personal visitation with the commit-



A. W. Childs, of the Southern California Edison Company, was always telling some fish story. Well, here he is putting over one pretty near half his height. But alas! the fish shown fading off to the left in this view was not one of his own catching for it is a huge salmon speared by some Indians in the San Joaquin River, just as the party was leaving San Joaquin Power Plant No. 1.

tee of John J. Gibson, manager of the supply department of the Westinghouse Electric & Manufacturing Company of East Pittsburgh. Mr. Gibson not only listened attentively to the discussions of the committee, but also contributed many helpful suggestions for the future work of the campaign.



A quiet little game of "seven-come-eleven" was played, too, whenever tire trouble gave occasion for a stop along the route. We refrain from naming those shown in the view. Can you pick them out?

Among the important work accomplished by the committee in its session was that of the adoption of a standard form for rating of the various contractor-dealers throughout California; and, also, the discussion of new and effective means of publicity that will tie-in with all phases of activity in the electrical industry in the West.

The Value of Publicity to the Electrical Industry

BY W. H. ONKEN, JR.

(The time has come for the electrical industry to take its rightful place not only in the activities of the world but in the estimation of the public. In the following address delivered before a recent meeting of the San Francisco Electrical Development League the editor of *Electrical World* emphasizes the importance of publicity to the attainment of this end.—The Editor.)

Out of the sagebrush and deserts of Arizona, Nevada and New Mexico and from the fertile fields of California has come many a vision. Indeed only a dreamer could see the relationship of the snow-capped mountains and deep canyons to the distant civilization, and only a pioneer could have the hardihood to interpret the dream. And what has been the result?

You have wrested from the melting snows of the high Sierras their God-given power and converted it into electricity for the use of man. You have transmitted that energy across ravine and canyon and expansive wastes to far-off cities and made every village and hamlet along the right of way tingle and glisten under its magic impulse. Through its agency you have brought water to the parched earth and there have sprung up orchards and vineyards and olive yards and fields of succulent alfalfa, vegetables and herbs to give sustenance to man and beast, where before there was naught but bare land.

Here you have the fruition of that prophecy of Isaiah: "The wilderness and the solitary place shall be glad for them and the desert shall rejoice and blossom like the rose." Compare, if you will, the murmur of these harnessed mountain streams with the roar of the thousands of industries set in motion by the potent force of electricity generated from them.

Electricity and Current Problems —

These are the realities; and yet the realities are small compared with the possibilities. Remove, for instance, the fetters which encompass the waters on the public domain in this Western country, give willing hands the right to work, the right to build, expand and develop, and the electrical industry, which alone can utilize these natural resources without destroying them, will create a greater and more powerful industrial empire.

Today social disorder and industrial unrest strut through the land. Housemaids are disappearing and labor demands more for its hire. Men everywhere are seeking a solution and heroically endeavoring to ward off impending revolution and chaos.

Electricity can be used effectually to stem this turbulent tide. By its means household drudgery can largely be removed and a servantless home become a pleasure instead of a curse. Washing, cleaning and cooking are made easy if performed electrically and become almost a pleasure. Applied to the shop and to industrial processes, electricity increases production. And what is more necessary at this present moment in this country than increased production? It is useless to complain of the high cost of living or to strive vainly to reduce it unless production is increased.

Moreover, since electricity enables a laborer to produce more in a given time, by the same token it permits him to earn more and to earn it honestly. Electricity is a panacea applicable alike to the finest needle that ever wove its way through the most delicate fabric, or to the most ponderous liner that ever plied its course across the mighty ocean.

The Call for Cooperation —

Possessing the knowledge, experience, judgment, ability and skill to perform all these wonders, ought we to remain quiescent and permit the dreams, ambitions and aspirations of those pioneers and geniuses who have blazed the trail before us, to be shattered because we are recreant to the obligations handed down to us? Our industry has had a won-

derful development and if it is to continue to develop, expand and grow, all branches of it must work together in all fairness and justice for the common good.

"One for all and all for one" should be the slogan. I care not if a man be a manufacturer, jobber, contractor, dealer, or the representative of a public utility, speaking by and large he cannot be more successful than the industry of which he forms a part unless, perchance, he is a genius. Hence the need for cooperative movements such as those which exist in this city and state.

Our industry is a complex one, however, and unless we are very careful we are apt to lose our sense of perspective. The success of the whole electrical business hangs on the success of the electric public utilities in the various communities. Our electrical manufacturers have an invested capital of approximately \$750,000,000 while the electric public utilities of the country alone have upwards of two and a half billions of capitalization. Hence a setback in the central station industry is felt all along the line.

The central stations of California can employ profitably \$25,000,000 a year for the next five or ten years on new developments and extensions if they can raise the money. This means added business for manufacturers and added opportunities for jobbers, dealers and contractors, not to mention the added comforts and industries which accrue to the state.

The Position of the Central Station —

One would think that this dependence of the other branches of the industry on the success of the public utilities was so apparent that it would need no elaboration. Such is not the case, however, and it is necessary to reiterate time and again that no matter what other branch of the electrical industry you may be engaged in, your bread and butter depend very largely on the expansion and continued growth of the central station industry. And unless the public utilities extend and reach out into new fields in anticipation of the demand for the service that is sure to follow, there will be very little field for the sale of electrical apparatus and supplies.

There is an old saying which aptly fits the situation:

"For want of a nail, the shoe was lost;
For want of a shoe the horse was lost;
For want of a horse the rider was lost;
For want of a rider the kingdom was lost;
And all for want of a horse shoe nail."

The horse shoe nail in this case is the money necessary for the development and expansion of the central station industry.

As you all know, the street railway business is in a deplorable condition, and if the trend of public opinion is against granting fair rates on capital invested in the electric public utility field, with the cost of labor and material increasing, the electric lighting companies will find themselves in like straitened circumstances. Of course they look for relief to the Public Service Commissioners. And if the Public Service Commissioners refuse to grant adequate rates to an electric lighting company—admitting, of course, that such increases are necessary and that every economy known to the art has been practiced—it is because enlightened public opinion is lacking.

The Force of Public Opinion —

The arousing of proper public sentiment is the most important thing that a body such as this can undertake and

hence the subject assigned me, "The Value of Publicity to all Elements of Our Industry."

Public opinion is the ultimate force that controls the destiny of this country and its institutions. No man or set of men may with impunity defy public opinion. No law can be enforced contrary to its behests, and even life itself is hardly worth living without its approbation.

Therefore, if we as a united industry possess ideals, are patriotic, recognize our public duty and truly represent American spirit and altruism, we have a right to expect public confidence and we shall not be disappointed in our hope. However, a good reputation is predicated on good deeds—and every effort should be made to win public support.

"Good name in man and woman, dear my lord,
Is the immediate jewel of their souls;
Who steals my purse, steals trash; 'tis something, nothing;
'Twas mine, 'tis his, and has been slave to thousands;
But he who filches from me my good name
Robs me of that which not enriches him
And makes me poor indeed."

Confidence and Accomplishment —

Now, how can public support be gained? In devious ways; but time would not permit even a brief enumeration. But back of them all must be honesty and integrity. Nothing else really matters. Dishonesty may succeed for a time or temporary prosperity be attained by unworthy methods, but, no matter what the rule may be for the short run, in the long run (and we are engaged in a business that is here for a long time), honesty and square dealing will win out if the public is properly informed.

There is every reason why we should feel optimistic about the outcome. We seek no mean advantage and expect only what is our due. Ours is a vocation for optimists. Idealism is the very stuff we thrive on. There is no room for pessimists in the electrical industry. Having faith and financial resources, success is certain. What better calling could a man want?

Is there any profession more ennobling or intrinsically more valuable to mankind? We are apt to think of a physician's calling as being ideally human and satisfying, and I will admit that it must be comforting to feel when humanity about you is in pain and travail that you possess the skill and knowledge to relieve suffering. I can envy a conscientious physician the glory and comfort which must be his. A lawyer likewise may take commendable pride in applying his knowledge of jurisprudence in righting wrongs and establishing justice and peace between man and man. But ought the proponents of electricity to be one whit less enthusiastic or assertive in their particular calling?

Isn't ours the greatest task an ambitious person with ideals can find? Helping the individual, helping the community, helping the state and nation, and at the same time making a worldly success for one's self?

Let the central station companies adopt for themselves the principle of public trusteeship. Let them gather the best equipment of machinery and personnel that money can command. Let them bring continuously into play the qualities and conditions which tend to maximum business efficiency. That is, experience, knowledge, special training and the zeal arising from opportunity and self-interest, so that by a combination of all these, economies of operation and of finance will result in the production of a unit of energy at less cost than anyone else can make it. (For when all is said and done, this is the only justification a central station has for existence.)

Then let the public utility distribute that energy, together with a complete knowledge of its uses, not as masters but as servants of the public, working for wages and conscious that it has a commodity that will work miracles. All that you can ask, all that you can expect, is a fair return on the investment necessary to produce and distribute that commodity, and the public for its part is protected in its rights

to efficient service and fair rates by duly appointed regulatory bodies.

Letting the World Know —

Show the world what electricity can do. We know that we have something worth while. We know there is no other form of lighting and power that can out rival it. We know it isn't costly, and why should we be afraid or backward in letting every one else know? The story of what electricity can and will do should be published broadcast by every means known to the ingenuity of man.

This is a campaign in which central station, jobbers, manufacturers, dealers and contractors can cooperate. This cooperation should be whole-hearted in word as well as in deed, so that the industry may present a solid and unified front to the world.

A unity of honest method.

A unity of laudable purpose.

A common area of valid, incontrovertible fact.

And no demagogue or adverse public opinion can withstand the onslaught.

Public reason depends on contact with objective information, not what somebody says, not what somebody wishes were true but what is true beyond the peradventure of doubt, constitutes the basis of public sentiment and judgment. "Ye shall know the truth and the truth shall make ye free." The demagogue, my friends, is only an undetected liar.

Any publicity campaign to be effective must be conceived and executed on a grand scale. Petty jealousies and narrow-mindedness must play no part in it. Frankness must be everywhere apparent. The primary object must be to develop the community and the state and not the particular business in which we are engaged. We must honestly believe in the righteousness of our cause and have faith to know that the community or state cannot advance without pulling us with it.

We must above all else be genuinely enthusiastic.

REGISTERED ENGINEERS

The Oregon State Board of Engineering Examiners at a meeting held October 3, granted certificates of registration, permitting the holders to practice professional engineering in Oregon, to 132 engineers. These are the first applicants to be accepted under the license law passed last winter which requires that all wishing to practice professional engineering in the state after January 1, 1920, hold such certificates. A list of those granted certificates follows:

H. E. Abry, J. H. Abbott, W. W. Amburn, C. Anderson, B. C. Ball, J. E. Butler, J. O. Baar, M. A. Baker, J. H. Ballweg, R. H. Baldock, P. W. Beasley, G. S. Beatty, M. O. Bennett, C. W. Boschke, L. Bergsvik, W. Bollons, G. W. Buck, W. E. Burkhalter, R. C. Bonser, G. H. Binkley, C. R. Beardsley, C. H. Benson, C. L. Brown, J. A. Currey, A. B. Carter, R. E. Cushman, S. B. Cathcart, D. D. Clarke, J. W. Cunningham, O. Cutler, J. J. Cullinan, R. I. Campbell, J. C. Cleghorn, W. H. Cullers, B. C. Condit, R. H. Coppock, J. H. Cary, J. J. Dickson, C. O. Diffenderfer, E. I. Davis, W. E. Eddy, F. W. Eichenlaub, C. S. Edmondstone, N. H. Entler, J. W. Ferguson, C. F. Fisher, D. G. Glass, J. N. Gearhart, S. Geijsbeek, A. K. Grondahl, D. R. Groves, F. C. Green, G. G. Hall, J. V. Halas, J. R. Hanson, A. Hadley, R. E. Hickson, W. S. Hodge, F. E. Hogan, H. M. Howard, G. A. Hoppe, D. C. Henny, J. F. Joyce, C. I. Kephardt, F. G. King, O. A. Kratz, R. E. Koon, C. P. Keyser, H. M. Lull, R. Lenoir, A. M. Lupfer, W. W. Lucius, Charles McGonigle, R. A. McClanathan, E. B. MacNaughton, A. J. McMillan, J. F. Meager, H. D. Hillis, E. T. Mische, W. E. Morris, O. B. Misz, S. Murray, G. C. Mason, W. H. Marsh, A. E. McKennett, J. B. Madden, W. I. Morrison, A. R. Moore, C. G. Nash, W. C. Nicholas, J. E. Nelson, J. P. Newell, H. Nunn, A. F. Perry, G. F. Parker, J. E. Peck, T. Pumphrey, D. K. Plowman, R. A. Pratt, V. H. Reineking, A. H. Richmond, C. M. Redfield, E. D. Roberts, H. J. Roberts, D. H. Rowe, F. M. Randlett, C. N. Reitze, O. E. Stanley, R. I. Stout, G. I. Stebins, C. F. Swigert, E. L. Strange, C. P. Smith, C. H. Smith, S. Smyth, A. S. Tee, C. F. Thomas, E. B. Thomson, W. S. Turner, E. L. Vinton, C. F. Waite, J. F. Waller, L. D. Williams, C. R. Wright, F. P. Wentz, E. Withycombe, H. C. A. Worrell, J. E. Yates, H. W. Young.

Mr. O. Laurgaard, president of the Board of Engineering Examiners, says that 360 applications have been filed, and that a total of 750 inquiries regarding the law have been received by the Board. He estimates that between 700 and 800 engineers will have been registered before the first of next year, after which time applicants will be required to pass examinations before certificates are issued.

HAPPENINGS IN THE INDUSTRY

REORGANIZATION OF FEDERAL ELECTRIC COMPANY

The Federal Electric Company was established at Chicago in 1899 as a manufacturer of sockets, bushings and specialties and later engaged in the manufacture of electric appliances and electric signs and all devices relating to load building of power companies. An unusual and novel electric sign was developed by the Federal Electric Company which was of such a nature that another corporation was formed for its marketing, known as the Federal Sign System (Electric). For many years the two corporations existed side by side and the Federal Sign System (Electric) became the marketing corporation for the Federal Electric Company and at a still later date purchased the Federal Electric Company and merged it with the Federal Sign System (Electric). Continued growth of the company's business in lines not related to electric signs was such that the volume of sales outside of the electric sign line far exceeded the electric sign business, and therefore the corporate name became a misnomer and changes are now taking place in the various subsidiary corporations, incorporated in various states, to change the name to Federal Electric Company.

This change has been completed in the Western division, which is controlled by the California corporation, and as soon as legal arrangements are made the change will be complete in all of the various corporations, as the company adopts the policy of separately incorporating in the various states wherever there is any advantage in so doing. The officers of the Western corporation comprise J. M. Gilchrist, president; H. I. Markham, treasurer; B. Ohlsson, secretary; T. W. Simpson, vice-president and western district manager; the directors comprise all of the above with Mr. John A. Britton. The company owns an electric sign factory and warehouse at Oakland, an electric sign factory and warehouse at Seattle, warehouse and supply headquarters at San Francisco, and branch sales offices at San Francisco, Oakland, Portland, Seattle and Salt Lake City.

In announcing the establishing of a full line jobbing and supply business in San Francisco, the company states:

"This company has selected certain centers for engaging in full line jobbing and it is not the intention to make shipments from the centers which have been selected for this activity into other jobbing territory where the company is not represented by complete facilities. It is not the intention of the Federal Electric Company from its jobbing and supply headquarters at San Francisco to sell outside of what is known as the San Francisco jobbing district. In other jobbing districts of the West it plans to continue the same policy as heretofore, namely, market Federal manufactured lines exclusively. The fact that the company has a large number of sales offices does not mean that it will disturb the existing jobbing conditions by long distance shipments outside of what is generally recognized to be present jobbing zones, as the company recognizes that to do so would render it impossible to give proper service in territories widely separated from the supply warehouse and headquarters."

COMMITTEE FOR REVISION OF ELECTRICAL UTILIZATION SAFETY ORDERS

The Committee for Revision of Electrical Utilization Safety Orders, appointed to cooperate with the California State Industrial Accident Commission, has been fully organized and is now active in its work of study and investigation. S. J. Lisberger has been appointed chairman, and during his absence in the East, Arthur Kempston is acting as temporary chairman. R. L. Eltringham, of the Commission, is secretary of all committees. There has already been a meeting of the general committees, besides three sessions of sub-committee chairmen. On November 6th, the Committee on Services met in the rooms of the Industrial Accident Commission, with Arthur Kempston as chairman.

As both the southern and the northern section of the state are represented on the committee, and as each section desires to have a part in the drafting of the rules, it has been

proposed by the chairman that the following method of procedure be followed:

That the chairmen of the several sub-committees located in the North will proceed with drafting their rules with as many committeemen as they can get in their own immediate section. The rules so drafted by them will then be turned over to the secretary, Mr. Eltringham; he will take them South, and there take up these rules with the representatives of the General Committee in the South. The General Committee representatives in the South will call a meeting of those affected by the rules, such as other contractors, dealers, jobbers, engineers, etc., and in the South they will discuss the rules as prepared by the North. The secretary will then bring these rules back North with him and they will be submitted to the Northern members for revision, etc.

Likewise the chairmen of the sub-committees in the South will proceed to draft their rules, and these will be transmitted through the secretary to the northern members, as before outlined. "All of the sub-committees are requested to give publicity to their meetings," says Mr. Lisberger, "in order that they will get full representation from the industry in drafting the rules. While the Main Committee is a representative one, it has been impossible to include many men whose services will be of value in drafting the rules, and it is hoped that these men will be called upon in order that the committee may get the benefit of their experience. It is also hoped that anyone having any thoughts regarding necessary rules under any general subject will transmit his opinions in writing to the chairman of the sub-committee, in order that they may be formulated into the Code."

The make-up of the General Committee is as follows:

S. J. Lisberger (chairman), Pacific Gas & Electric Company, San Francisco; R. H. Manahan (vice-chairman), City Electrician, Los Angeles; Arthur Kempston (temporary chairman), Chief Department of Electricity, San Francisco; H. W. Stitt, City Electrical Inspector, Fresno; Carl E. Hardy, Superintendent Department of Electricity, Oakland; T. B. Lewis, Southern California Edison Company, Los Angeles; C. W. Mitchell, Electrical Engineer, Board of Underwriters of the Pacific, San Francisco; J. C. McCaugher, Assistant Secretary, Board of Underwriters of the Pacific, San Francisco; C. E. Fleager, Plant Engineer, Pacific Telephone and Telegraph Company, San Francisco; E. E. Brown, San Francisco; G. E. Arbogast, Los Angeles; Morris M. Bruce, San Francisco; W. W. Hanson, Consulting Engineer, San Francisco; B. B. Beckett, Palo Alto; J. H. Clover, San Francisco; James McKnight, San Francisco; Lloyd Henley, Assistant Engineer, State Railroad Commission, San Francisco; R. A. Balzari, Westinghouse Electric & Manufacturing Company, San Francisco; M. C. Hickson, General Electric Company, San Francisco; E. M. Schlesinger, San Francisco; Samuel A. Russell, H. B. Squires Company, San Francisco; C. A. Jordan, Oakland; R. E. Swain, Pacific District Council, I. B. E. W., San Francisco; W. T. Bivins, San Francisco; B. C. Hill, Supervising Inspector, Electrical Department, City of Oakland; T. A. Panter, Assistant Electrical Engineer, Bureau of Power and Light, Oakland; George F. Flatley, San Francisco; Charles W. Hillis, Electric Appliance Company, San Francisco; H. M. Wolfkin, Superintendent of Safety, Industrial Accident Commission, San Francisco; Robert L. Eltringham (secretary), Electrical Engineer, Industrial Accident Commission, San Francisco. Temporary appointments: Amos H. Feely, Business Agent, Local Union 378, I. B. E. W., San Francisco; W. H. Pierce, Intern Organizer, I. B. E. W., Los Angeles. Alternates: Daniel W. Martin, P. H. Affolter, A. E. Rowe, H. L. Yost, John W. Carrell.

The sub-committees which have been organized cover the following subjects: Scope; Definitions; Meters and Meter Boards; Branch Circuit Distribution; Feeds, Sub-Feeds and Distribution Centers; Garages, Public and Private; Motor Control and Protection; Motor Installations; Heating Devices; Lighting Fixtures and Appliances; Generators and Rotary Converters; Transformers, including Vaults; Rectifiers, Mercury Arc, Vibrating, Electrolytic; Storage Batteries; Electric Haulage Equipment, Cranes, Elevators, Conveyors, Stackers and Similar Equipment; Signs and Outline Lighting; Theaters and Motion Picture Establishments; Signal Communication Systems; Radio Communications; Electro-Therapeutic and X-Ray Equipment; Conduit; Open Work and Concealed Knob and Tube Wires; Metal Raceways; Substations, Overhead and Underground Lines.

At the organization meeting of September 6th, the following resolution, submitted by Arthur Kempston, was adopted by the General Committee:

Whereas, It is highly desirable to provide a single set of rules and requirements embodying the present "Electrical Utilization Safety Orders," issued by the Industrial Accident Commission of the State of California, and the "National Electrical Code" as recommended by the National Fire Protection Association; and

Whereas, The continuation and recognition of existing national standards for fittings and material, as well as the methods of installation, is of the utmost importance; therefore be it

Resolved, That these principles are hereby adopted by this Committee as its policy, and that all rules and requirements proposed by subcommittees comply with the following:

1st: That the present form of the "Code" and "Safety Orders" be disregarded and a new form adopted providing for the grouping of all rules relating to a subject under the title of that subject; also that the subject titles relate to the classification of the installation such as "Service," "Motors," "Fixtures," etc., and not as to materials used.

2nd: That, in order to permit cities, towns or other political subdivisions to require, within the rules and requirements, such higher grades of installation as determined by their legislative bodies to be desirable, the rules prepared shall provide minimum requirements and shall include recommendations for major requirements, thus permitting a selection within the rules in such instances.

3rd: That all rules be written in language clearly understood by an average electrical worker, be mandatory in form and explicit in requirement.

4th: That, in the preparation of rules and regulations by subcommittees, there be a minimum deviation from present practices except such rules recommended by subcommittee and approved by general committee.

5th: That the specifications for fittings and material contained in Class "D" of the "National Electrical Code" be unchanged and provision directly made for recognition of the labels issued by the Underwriters' Laboratories, both fire and accident, with provision for condemnation of substandard and unsafe devices.

WESTERN ELECTRIC ANNIVERSARY

In November the Western Electric Company celebrates the 50th anniversary of its founding. In 1869 the firm of Gray & Barton was formed to manufacture telegraph instruments, bells and buzzers, and from these small beginnings, at the time when the commercial applications of electricity were in their infancy, the present company has developed until now its activities cover the entire world.

ENGINEERS' EXAMINATION

An examination will be held on December 5th, 1919, at 520 Corbett Building, Portland, Oregon, for all professional engineers who are unable to meet the requirements without examination, of the Act of the Legislature of the State of Oregon, 1919, Chapter 381, requiring all professional engineers to be registered after January, 1920.

Necessary blanks for application to take the examination may be had upon request from A. B. Carter, Secretary State Board of Engineering Examiners, 420 Corbett Building, Portland, Ore. All applications to take the examination given on December 5, 1919, must be filed with the State Board of Engineering Examiners at least thirty (30) days before December 5, 1919.

TRADE NOTES

New Offices —

The Brokaw-Eden Company, manufacturers of the Eden washing machine, have opened new division offices in San Francisco at 733 Rialto Building.

Foreign Agent —

The Roller-Smith Company, main office and export department at 233 Broadway, New York City, manufacturers of electrical protective and measuring apparatus, announces that it is now represented in Cuba by Martinez Cartaya & Bueno, located at Muralla 40, Havana, Cuba.

Martinez Cartaya & Bueno, who represent also the Wagner Electric Manufacturing Company, will handle the Roller-Smith products of electrical measuring instruments, watt-hour meters and circuit breakers on an exclusive agency basis for the entire island of Cuba.

New Orders —

The Electric Furnace Construction Company, Finance Building, Philadelphia, advises orders received for "Greaves-Ethells" electric furnaces from Lacheze et Fils, Dijon, and C. Markham & Co., Ltd., Chesterfield.

Industrial Survey —

Holbrook, Merrill & Stetson are about to send their commercial attache, Mr. Nathan A. Hurwitz, on a trip to Australia, the Dutch East Indies, the Straits Settlements, China, Siberia and Japan, in which countries he will make an exhaustive survey of conditions, interviewing financiers, builders, engineers, manufacturers, jobbers and general merchants. The company reports an optimistic view of the expansion to be gained in this way.

Western Office Opened —

The McMyler-Interstate Company, manufacturers of coal and ore handling machinery, locomotive cranes, railroad equipment, etc., have opened a branch office in the Merchants Exchange Building San Francisco, with L. A. Somers as district representative.

Contracts Awarded —

NePage McKenny Company of Portland, Ore., have the contract for the electrical equipment of the new plant of the Oregon Casket Company and also of the St. Johns Terminal Company.

Smith McCoy Electric Company installed the wiring for the Pure Food Show now in progress in Portland.

National Electric Company has the following contracts under construction at the present time: Telephone Exchange, Arleta; Masonic Apartments, The Dalles, Ore.; Western Structural Steel Company, Live Stock Exchange Building, and Astoria Flour Mills.

Jaggar-Sroufe Company are completing the wiring of two boats for J. R. Hamify Company, Marshfield, and have the contracts for the Elks Building, Pendleton; New Pacific Power & Light Company's station, Astoria; the new Mitchell Lewis Staves Company's building, and the cutting over of the Meier & Frank Company's store of the lighting system to alternating current for the Northwestern Electric Company.

Electrical Department Opened —

The largest department store in Portland, the Meier & Frank Company, have opened up a complete electric appliance store in their basement, with J. C. Naylor in charge. Mr. Naylor was at one time district manager at Goldendale, Wash., from which position he resigned to enter the army. He was in the 80th Division, 305th Engineers, and served one and one-half years.

Notice of Removal —

The Meyers Electric Safety Switch Company of 1236 Mission Street, San Francisco, announce their removal on November 15th to larger quarters at 247 Minna Street.

New Store —

Spott Brothers have opened a new electrical store in Oakland.

New Retail Establishment —

P. H. Smith, formerly of the Chicago office of the Hurley Machine Company, comes to the Pacific Coast to take charge

of the recently established Thor Shop at 124 Post St., San Francisco. This attractive store is devoted entirely to washing machines, acting as a service station in co-operation with the contractor-dealers, and conducting a continuous demonstration on its premises. Full details of the establishment are given elsewhere in this issue. B. Badrian, formerly sales manager for the company in northern California, is now district

sales manager for the Pacific Coast.

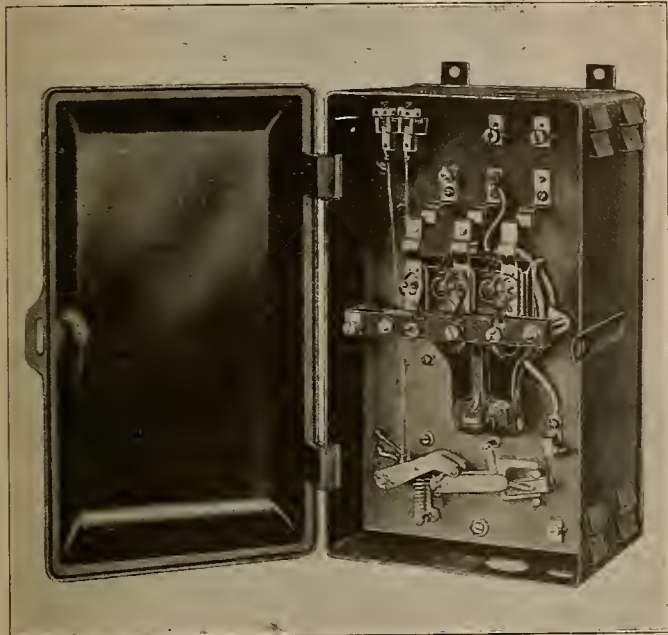


LATEST IN EVERYTHING ELECTRICAL

(New designs in switches featuring special safety devices and simplicity of operation are among the recent industrial items presented here. A distribution type transformer with exceptionally highly developed insulation and a conveniently adaptable indicator are also described.—The Editor.)

NEW STARTING SWITCH

It is permissible to start induction motors up to and including 5-hp., and in some localities up to and including 7½-hp., by merely connecting the motor to the power circuit. Small induction motors can be started under these conditions



This starting switch, enclosed in a steel box, with conduit connection for all wires, has special devices for automatic overload protection.

without injury, and in the past it has been customary to start them by simply closing a knife switch, or switch similar to a knife switch.

For the man who wanted something better, there were switches which would short circuit the fuses while the motor was starting; and then after the motor had come up to speed, the operator could make a second motion with a starting switch, inserting the fuses in the motor circuit, to be used while it was running.

A new device for this kind of work has just been developed by the Electric Controller & Manufacturing Company of Cleveland, Ohio, to make the starting of these motors fool-proof. It is known as the A.C. Starting Switch, and is operated by a push button. It is enclosed in a steel box, with conduit connection for all wires. A neat compact push button arranged for conduit connection is supplied, for "starting" or "stopping" the motor.

Two wires extending the length of the slate on one side, give overload protection of the inverse time element type, both while the motor is starting and while it is running.

The principle used is one entirely new in motor starting practice. These two wires are stretched, and the operating value of this overload protection is adjustable by changing the tension of the wire. If too much current is being taken by the motor, these wires will expand, causing the small contact at the bottom to be open and this will in turn, de-energize the magnet coil and cut the motor off the power line. It is then necessary to push the Start button before the motor can again be started.

The same principle is used in ammeters, and gives an extremely accurate overload protection, at the same time giving inverse time element feature.

There are no laminations used in any part of this a.c. starting switch. It is only necessary to push the Start button to start the motor, and it is only necessary to push the Stop button to stop the motor.

DISTRIBUTION TYPE TRANSFORMERS

Both shell and core type constructions are used by the Wagner Electric Manufacturing Company, of St. Louis, in their distribution transformers. For 2300 volts, core type construction is employed in the smaller sizes, and the shell type in larger sizes. For 6900 volts and higher the core type is used exclusively.

Special attention has been paid to insulation. All insulating materials are carefully tested, and double cotton covered wire is used for all coils. The various layers of the high voltage coils are separated by two thicknesses of a tough fibrous material, each of which will withstand three times normal voltage per layer. Two layers form a much more reliable insulation than a single layer of double thickness. In all coils, the layer insulation is considerably wider than the winding, thus giving additional protection to the end turns.

A practically indestructible barrier between low-voltage and high-voltage coils is secured by mica tubes reinforced with fibre insulating material to give strength. This tube projects beyond the ends of the coils so that the low-voltage winding is as safe from high voltages as it is possible to make it.



Coil and core assembly of the Wagner core-type distribution transformer

In order to make the transformer coils doubly safe they are treated with an impregnating compound. This is applied in a heated vacuum tank so that it is forced into

every fibre of the thoroughly dried insulation. Coils thus treated have much greater mechanical strength, conduct heat more readily and are much less affected by moisture than those that are untreated.

In mechanical design the transformers have various special features. The coils are so mounted that there is no possible chance of their becoming loose in transportation and handling. The low-voltage leads are all brought out through one opening in the case, so that no stray currents will be set up in the case, causing losses. The porcelain bushings through which the leads pass are patented, and are so designed that the leads cannot possibly touch each other or touch the case.

The regulation of Wagner Transformers is well within standard practice. The windings are so arranged that even on motor loads the drop in voltage is not enough seriously to affect the candle-power of lamps on the circuit.

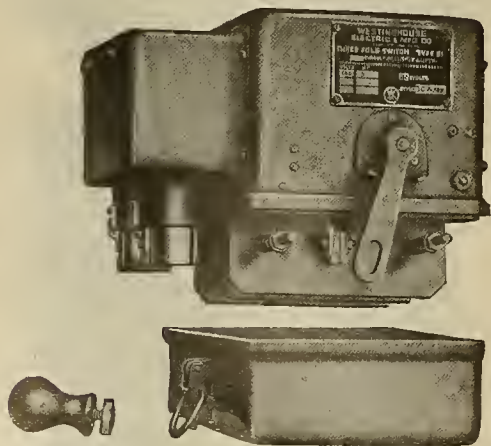
The transformers have generous coil surfaces so that they radiate heat readily to the oil, and the case surfaces are sufficiently large to radiate the heat carried to them by the oil. Furthermore, the coils are so designed that there are no pockets in which the oil will become stagnant and excessively hot and dangerous to the insulation.

SAFETY STARTING SWITCH

Safety for the operator, safety for the motor and equipment and safety for itself are the three features embodied in a new type of starting switch for small induction motors that is being put on the market by the Westinghouse Electric & Manufacturing Company. The switch is absolutely accident proof and practically fool proof as well.

The action of the switch is automatic and consists of strong springs attached to the contact parts and controlled by a trigger. This trigger is released by overload, failure of power or by hand. When the switch passes the neutral point, the spring snaps it the rest of the way. Safety to the operator from injury due to contact with live parts is assured by the entirely enclosed, dust-and-dirt proof case. It is impossible to touch the live parts by accident for this reason.

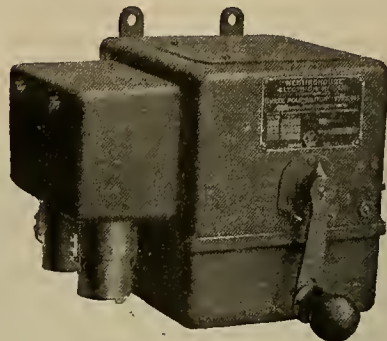
To ensure safety to the operator and equipment from restarting after the machine has shut down, a low voltage protective relay releases the trigger when power leaves the equipment, and throws the switch. Upon the return of power, it is necessary for the operator to move the handle first to the reset position and then to the running position, before the motor can be restarted.



A low voltage protective relay releases the trigger when power leaves the equipment, and throws the switch.

Any undue overload causes the overload relay to release a trigger, which opens the switch as in the case of failure of voltage. Overload throws off the switch just the same as no power does, and the switch must be reset before the motor can be started again. This overload relay prevents burn-out

of the motor. Motor burn-outs may arise from two causes—an overload machine or the opening of one wire, due to the blowing of a fuse or other cause, and subjecting the remaining phase to a double burden. The overload relay may be set to open the switch at any desired point, such as 105%—110%—150% of full load. Fuse protection is not sufficient to guard motors against burn-out. A fuse that will carry, without blowing, the starting current which is several times the operating current, will also carry, without blowing, sufficient overload to burn out the motor. The overload relay is provided with oil dash pots which afford a time element, permitting the carrying of small peak loads and the starting current



An entirely enclosed dust-and-dirt proof case prevents any danger to the operator from contact with live parts.

without interruption of service. However, they will allow the operation of the overload relay if the overload is heavy or is sustained long enough to threaten the motor. This insures the motor against burn-out and at the same time permits maximum production.

Replacing burned-out fuses with copper wire when new fuses are not available, results in a burned-out motor, the next time an overload occurs. This danger is eliminated because the new switch uses no fuses and automatically resets itself when the overload is removed. Beside this, the danger of shocks and burns in replacing burned-out fuses is eliminated.

When the handle of the switch, moving toward the ON position, passes the neutral point, the spring whips the contacts together. The same action takes place with the opening of the switch. This rapid opening and closing of the contacts practically eliminates the injurious effects of arcing and preserves the life of the switch.

Asbestos barriers, between the sets of adjacent contacts, have permitted the omission of switch oil with all its accompanying fire hazards and other objectionable features. But when explosive gases are present and the danger of explosion is greater than the fire hazard, the contacts may be immersed in oil.

Emergency stop push buttons may be connected in the low voltage relay circuit and located at any convenient point near the machine. This switch has been approved by the National Board of Fire Underwriters. Two sizes are made, each for use on two and three phase motors, on voltage up to 600.

UNIVERSAL INDICATOR

The outstanding feature of the "Universal C. O. D. Indicator" manufactured by the Roller-Smith Company of New York is that it can be applied to all makes of cars, regardless of varying types of lighting, voltage, and starting systems.

It can be connected in the starting circuit, if necessary, as in the case of certain single unit systems, and the cranking current, no matter how heavy, will not injure it.

The diameter of the body is 2 inches and the depth behind the flange $\frac{1}{2}$ inch. It derives its name "C. O. D." from the three indications on its movable barrel—"Charge," "Off," "Discharge."

Books and Bulletins

Principles of Direct-Current Machines

by Alexander S. Langsdorf, M. M. E., Professor of Electrical Engineering and dean of the Schools of Engineering and Architecture, Washington University. 460 pages; size 6 x 8½ in. Published by McGraw-Hill Book Company, Inc., New York, and on sale at the Technical Book Shop, San Francisco, price \$4.00.

As a comprehensive treatment of the fundamental principles underlying the design and operation of all types of direct-current machinery, this book holds an important place among text books for students of electrical engineering. The present edition is a complete revision of the first, published four years ago, and has been considerably amplified. The explanations are full but concise, and adequately illustrated with line drawings. Each chapter concludes with a set of problems covering the preceding material.

The book includes eleven chapters, the first of which is entirely devoted to general laws and definitions.

Bureau of Standards

Among recent Technologic papers of the Bureau of Standards is Electrolysis in Concrete, Paper No. 18, by E. B. Rosa, Burton McCollum and O. S. Peters. This paper constitutes a revision of Technologic Paper No. 18 on Electrolysis in Concrete, issued March 19, 1913. It contains the results of a series of long time tests which show that with reinforcing iron anode at very low current densities, rusting of the iron and cracking of the concrete eventually occur. In the specimens under test, damage became apparent in from four to eight years. The cathode effects noted in former tests had not progressed much beyond the point reached at the end of the first two or three years.

Paper 127 of the same series is "Leakage Resistance of Street Railway Roadbeds and its Relation to Electrolysis of Underground Structures," by E. R. Shepard. Several methods of making electrical resistance measurements on street railway roadbeds, and on experimental roadbeds are described and the results of such measurements are given in tabular and graphical form. Certain conclusions are reached regarding the best type of roadbeds and the best methods of treating ties where the reduction of stray currents is important.

Magnets for Industrial Use

The Cutler-Hammer Manufacturing Company of Milwaukee and New York have prepared a number of standard (8½ by 11 in.) descriptive booklets which illustrate and describe various types of C-H apparatus. A recent addition to this list of publications is known as Booklet "J" and is illustrative and descriptive of C-H Rectangular Magnets which are particularly adapted for efficient handling of regular shapes in steel and iron. The advantages of using a rectangular magnet over any other type for handling such material as sheets, bars, billets, ingots, pipes, etc., is maximum lifting capacity for a given weight of magnet, resulting in economy in the price of the magnet, crane equipment, and current consumption, and besides, greater speed in handling the material. The booklet makes mention of a few typical applications where C-H rectangular magnets are handling ship plates, pipe, cold-rolled steel in coils, and other material. In one instance, one of the magnets had a record of unloading 50 tons of plate in 50 minutes from a railroad car to stock pile. Numerous illustrations show the magnets in use in several prominent plants. The booklet describes the magnet construction, gives dimensions and other engineering data and tables of lifting capacities for various classes of material.

Measuring Flow in Pipes

The selection of the type of meter to be employed in measuring the flow of water through a pipe line should be

based upon the consideration of the difficulties of installation, permanency of operation, accuracy of measurement, and the cost of installation and maintenance. Tests to determine the practicability of employing thin-plate orifices in pipe lines, and the conditions most favorable for their use as measuring devices, have been completed by the Engineering Experiment Station of the University of Illinois under the direction of R. E. Davis, Associate in Civil Engineering, and H. H. Jordan, Assistant Professor in General Engineering Drawing.

The tests were conducted with three sets of orifices of eight different diameters per set cut in 3/16-inch steel plates. Data were obtained from 4-inch, 6-inch, and 12-inch pipe systems respectively. The results of these tests are given in detail in Bulletin No. 109 entitled, "The Orifice as a Means of Measuring Flow of Water through a Pipe."

Copies of Bulletin No. 109 may be had without charge by addressing the Engineering Experiment Station, Urbana, Illinois.

Electrical Devices for the Farm

An attractively illustrated booklet with a three-color art cover and pleasing two-color pages, setting forth more than seventy uses to which electric power can be applied as an efficiency builder and labor saver on the farm, is a recent publication of the Westinghouse Electric & Manufacturing Company of East Pittsburgh, Penn., entitled "The New Farm Help."

The booklet explains not only how electric power can be utilized for doing a large amount of work on the farm, but how it provides the best, safest and most convenient form of light and how it takes the drudgery out of many of the hardest household tasks of the farmer's wife.

Not only are many illustrations given showing in detail various forms of electrical apparatus in operation, but much instructive information is set forth relative to the selection of sizes of motors to be used for driving various machines, especially of the heavier types, and how to be sure of getting reliable electrical apparatus.

Bureau of Mines

Excerpts from the monthly reports on minerals investigations of the Bureau of Mines include three articles on iron, copper, and gold and silver respectively; a paper on the Manganese Situation by W. R. Crane; on Abrasives by O. Bowles; on Magnesite, and on Talc and Soapstone. W. C. Phalen and R. B. Ladoo were respectively in charge of the two latter investigations.

"Explosives and Miscellaneous Investigations" is the title of Bulletin 178 D just issued by the Bureau. "The Vapor Pressure of Lead Chloride" by E. D. Eastman and L. H. Duschak is Technical Paper 225.

The monthly statements listing the coal mine fatalities in the United States for the months of June and July, 1919, compiled by Albert H. Fay for the Bureau of Mines, have recently been sent out.

Transactions, Proceedings and Reports

The July, 1919 issue of the Transactions of the South African Institute of Electrical Engineers has recently been received.

The Society for the Promotion of Engineering Education has sent out its bulletin—"Engineering Education"—for September.

The Bulletin of the National Electric Light Association for September has recently been issued.

The American Society of Electrical Engineers has published its Proceedings for October, 1919.

The Statistical Report of Electric Undertakings in Japan, for June, 1919, has been received from the Department of Communications, Tokyo, Japan.

The October number of Mechanical Engineering, the monthly journal of the American Society of Mechanical Engineers, is now being distributed.

NEW ELECTRICAL DEVELOPMENTS

(A number of important new power installations are features of the Northwest activities during the past two weeks. Interesting particulars of the Don Pedro project come in with the news of the Pacific Central district, together with several far-reaching plans for transmission and power developments. The Pacific Southwest and the Intermountain district are active in irrigation and the improved distribution of electricity.—The Editor.)

THE PACIFIC NORTHWEST

CENTRALIA, WASH.—The Washington Light & Power Company is considering the matter of erecting a plant here.

ASTORIA, ORE.—The repair shop of the Pacific Power & Light Company has been destroyed by fire, causing a loss of \$20,000.

VANCOUVER, WASH.—It is proposed to provide the city of Vancouver with a strictly modern, up-to-date and attractive lighting system.

BEND, ORE.—At a recent meeting of the city council the mayor suggested that an adequate system of municipal lighting should be adopted.

ASTORIA, ORE.—The Port Commission has taken up the matter of installing an underground electric power system throughout the port property.

TACOMA, WASH.—According to figures submitted by the city light and power department of Tacoma, it has made a net profit of \$296,914 for the first nine months of the year.

THE DALLES, ORE.—Cluster lights will be installed along Second Street, the main thoroughfare of the city. Ten city blocks will be lighted with three clusters to each block.

SPOKANE, WASH.—Latest returns from an election recently held here indicate that the proposal to have the city acquire and operate a hydroelectric power plant was voted down.

TACOMA, WASH.—Allis-Chalmers Manufacturing Company recently sold to the Defiance Lumber Company at Tacoma a 150 and a 75-hp. motor, power being supplied by the Tacoma municipal plant.

CENTRALIA, WASH.—The City Commission has signed up a contract with the Sherman County Light & Power Company to furnish current to the city for the five-year period from October 1, 1920.

PETERSBURG, ALASKA.—A site for a \$75,000 hydroelectric plant has been acquired near here by the city council and it is expected that the plant will be built at once. It is to have 5,000 hp. capacity.

EVERETT, WASH.—The city will not hold the election which was to have been held on November 15 to decide whether or not a municipal power plant shall be constructed, and asking for sufficient bonds to cover the proposal.

LOS ANGELES, CAL.—Wilmington Transportation Company has sold to the city of Avalon the city water and power system. A new gas plant will be built. A \$150,000 bond issue provided for the purchase of property and the erection of the gas plant.

VENTURA, CAL.—The Sespe Light & Power Company has made application to the State Railroad Commission for a certificate to develop electrical energy in Ventura county and to make 100,000 acre-ft. of water available for irrigation purposes. Two reservoirs will be constructed.

SEATTLE, WASH.—The city of Seattle has awarded a contract to the Pelton Water Wheel Company for an 18,000 hp. water wheel at \$73,616 and to the Westinghouse Electric & Manufacturing Company a contract for a 14,285-kva. generator at \$63,175, delivery in seven months.

SEATTLE, WASH.—Fairbanks, Morse & Company, 550 First Avenue South, Seattle, recently shipped a 75-hp. engine to the Ladysmith Smelter Corporation at Latouche, Alaska, and a 100-hp engine to the Salt Chuck Mining Company

at Cassan, Alaska. These are of the Type "Y" semi-Diesel engine.

KLAMATH FALLS, ORE.—The Pelican Bay Lumber Company of this city has just placed an order with the Portland office of Allis-Chalmers Manufacturing Company for a 1000-kw. turbine. This unit will be complete with condenser, exciter and centrifugal injection pump. The machinery is for 480 volts, 60 cycle, three-phase service and has a capacity of 1500 amperes per terminal at full speed.

SEATTLE, WASH.—Specifications submitted to the Board of Public Works some two months ago, covering the construction work and materials required in the creation of the Swan Lake impounding reservoir, are being revised in compliance with the request of the Board and it is thought by the assistant superintendent of water, John Lamp, that calls for bids for the construction contracts may be made late this fall.

SEATTLE, WASH.—C. F. Uhden, engineer in charge of the Skagit River power project construction, is of the opinion that the city will be using current from the hydroelectric plant on the Skagit River within three years. After a further study of the Gorge Creek conditions and various details of preliminary work, he outlined his plans to Mayor Fitzgerald. The engineer is inclined to favor construction of a steam road from Rockport, the nearest railroad point, which is 23 miles from Gorge Creek.

SEATTLE, WASH.—Increase of fare on Seattle's municipal street railway system from 5 cents to 6 cents with an additional charge of 1 cent for transfers, is forecast in a report covering the finances of the street railway department for the six months' period ending September 30, filed with the city council. Asserting that the operating expenses will be increased about \$500,000 a year by the passage of the pending ordinance requiring the street railway department to stand the cost of paving between tracks, Superintendent Murphine states that the department will be unable to pay this increased expense out of the present revenues.

SEATTLE, WASH.—Allis-Chalmers Manufacturing Company was recently awarded a contract by the city for a 12,500-kw. steam turbine unit, 80 per cent power factor, complete with 200-kw. exciter. The exciter will be driven by both steam turbine and electric motor. The contract for this equipment was placed direct with the Allis-Chalmers Manufacturing Company through its Seattle sales office and was not a combined bid with Charles C. Moore & Company, as was indicated in the Journal of October 15. Charles C. Moore & Company were awarded the contract for boilers and auxiliary equipment as heretofore announced.

WENATCHEE, WASH.—As a solution to the power problem of the Wenatchee valley, General Manager George D. Brown of the Wenatchee Valley Gas & Electric Company has submitted to the power users and the public a proposition to buy the bonds necessary to finance an enlargement of the Chelan Falls plant. It is estimated that the cost of adding another 1000 hp. to the Chelan Falls plant will be \$80,000. The company proposes to issue first mortgage bonds bearing six per cent interest secured by this plant and the contracts for the sale of the power and asks the power users of the valley to buy these bonds at once so that the machinery can be ordered and the unit installed in time for next season's business.

THE PACIFIC CENTRAL DISTRICT

WOODLAND, CAL.—Woodland is to have an underground wire system for light, power and telephone within the fire limits.

MARTINEZ, CAL.—The Commissioner's sale of the Oakland, Antioch and Eastern Electric Railroad to satisfy a mortgage against the line for \$6,500,000, has been postponed until November.

ESCALON, CAL.—Escalon Water and Light Company is installing a new pump at a cost of over \$2,000. It is one of the Byron Jackson latest models, 12-inch 7-stage, to be operated with a 25-hp. horizontal motor.

SAN FRANCISCO, CAL.—Western States Gas & Electric Company has closed a contract with the California Wine Association for 150 horsepower in motors for the Fresno Cooperaage Company, which is establishing a plant at Richmond to employ about 200 men.

RICHMOND, CAL.—The city council and members of the Merchants' Association discussed plans for lighting the business streets of the city with electroliers in place of the arc lights now used. It is planned to have the electric light company install the system and to have the city purchase it in yearly payments.

SAN FRANCISCO, CAL.—The Board of Supervisors has granted John A. Fears a spur track permit to switch electrically driven cars across Mission Street at Twelfth. A large industry with a building to cost \$250,000 was to be established at that point when the spur track privilege was obtained, it was said.

BRODERICK, CAL.—Geo. Swanston is the owner of about 4000 acres north of the Southern Pacific Railroad within the Yolo Basin. He is taking the first steps toward reclaiming this land. For irrigation purposes two fifteen-inch pumps will be used and wells of sufficient capacity will be drilled to a depth of over two hundred feet.

REDDING, CAL.—The Pit River Power Company, which is to spend \$17,000,000 on power development along Pit River above Copper City, has just completed surveying contours on both sides of the stream for a distance of 25 miles. The contours at an altitude of 200 feet mark the proposed height of the lower dam, which will back up the river twenty miles or more.

WOODLAND, CAL.—Contracts for the rebuilding of several miles of irrigation canals, water heads and gates have been let to Shattuck-Eddinger Company of San Francisco by the Yolo Water and Power Company. The canals to be rebuilt are the Maple Canal at Woodland and the Willow Canal at Winters. The improvements will enable the company to double its irrigation service next season.

ALTURAS, CAL.—An agreement prepared by E. C. Bonner was signed in his office by directors of the Hot Springs Valley Irrigation District, J. V. Caldwell, J. W. Cummings, H. Stuber, E. D. Claussen and G. M. Kelley, with H. P. Wood for the purchase of 800 acres and water rights of H. P. Wood on what is known as Big Sage. The full purchase price of \$20,000 cash is to be paid on or before June 7, 1920.

MARYSVILLE, CAL.—Surveying of the extension of the ditch of the recently organized Cordua Irrigation Company was commenced by Arthur Edmonson, civil engineer of Palo Alto. Under the new plans 5422 acres of land will be served with water from Yuba River through the "Cleveland ditch" and its extension. Rice and

vegetables will be the principal products of the district, which is situated about six miles north-east of Marysville.

PORTERVILLE, CAL.—The Western Pipe & Steel Company of San Francisco has been awarded the contract for the auxiliary gas plant which is to be built here by the Central Counties Gas Company. The local plant, which is being built at the foot of Bartlett hill, near the northern city limits, will furnish gas to Porterville, Lindsay and Exeter, in case of any interruption in supply from the central generating station in Visalia.

YUBA CITY, CAL.—Surveying and excavation work which will extend from the Sutter-Butte canal to Gilhauer slough and include 20,000 acres to be planted to rice in Sutter county has been begun by Painter & Miller, engineers of Marysville. There will be a canal eight miles long to carry water to the rice fields. The project is the largest of its kind ever launched in Sutter county and is expected to lead to other large developments in the rice industry here.

PARADISE, CAL.—The Board of Directors of the Paradise Irrigation District have ordered a bond election for the purpose of voting a second bond issue in the amount of \$140,000. The money derived from the sale of bonds will be used in placing a 36-inch pipe from the reservoir to the present intake pipes, thus doing away with the canal, which has proved expensive and wasteful. The present system, with radial gates in the spillway at the dam, will allow five feet more in depth of water in the reservoir.

MERCED, CAL.—After a long executive session, the board of supervisors announced that they had reached a favorable agreement on the matter of the petition for the formation of the Merced Irrigation District and issued a fall for a special election for a vote on the matter. The election will be held November 25. The petition for the four smaller districts, the lands of which lie within the proposed district, was denied. The Plainsburg district petition was allowed. The boundaries of the Merced district, as finally settled by the board, include a total of 17,420 acres.

FORT JONES, CAL.—Scott Valley has two great enterprises, a railroad and an irrigation project, in addition to the irrigation district, which mean much toward the further development of the varied resources of this district. Promoters of both are confident they will become realities. A party of engineers has been at work at the upper end of the valley for the past week running surveys and taking levels for a cooperative irrigation project. It is understood that the purpose of this is to provide the Scott Valley irrigation district's big ditch with an increased volume of water, and also to increase the acreage to be covered by irrigation.

SONOMA COUNTY, CAL.—Indications that the California Telephone & Light Company, operating in Sonoma county, intends to purchase the Mount Konocti Light & Power Company, operating in Lakeport, Kelseyville, Upper Lake and Hopland in Lake and Mendocino counties, are contained in the petition filed with the State Railroad Commission by the Mount Konocti Company to sell to the California Company. The Mount Konocti plant cost, it is said, \$81,868 to construct. The sale price mentioned is \$71,400. The California Company, which joins in the petition, asks that it be allowed to issue \$75,000 in bonds with which to consummate the deal.

AUBURN, CAL.—The Pacific Gas & Electric Company has accepted delivery of a large consignment of Anaconda heavy copper wire, which is unloaded at the Wise Power House near this city. The shipment is valued at \$125,000. A top power line will be installed from the Wise Power Station to supply the Sacramento Valley demands. Work is to be commenced at once on the additional power line. Negotiations are under way to erect and maintain a third power station in this county, near Loomis, re-

ceiving surplus overflow from the Wise Station, and increasing the power development. Water used at the projected station will not interfere with irrigation supply over the territory involved.

PORTERVILLE, CAL.—Materials are being assembled and a crew is being recruited here for a complete reconstruction of the transmission system of the Mt. Whitney Power & Electric Company, which will entail building 80 miles of 60,000-volt line to replace the 30,000 line now in use. A complete private telephone line is also to be built connecting all plants and stations on the system, and other means will be taken to make possible speedy location of line trouble. The longest line in the new system will be that from the new substation at Richgrove, via Porterville, Ducor, Lindsay and Strathmore, which will be about 35 miles in length. Because of the uncertainty of the supply of copper, aluminum wires are to be used in this work.

OAKDALE, CAL.—Additional power is to be generated by the Sierra and San Francisco Power Company on the Stanislaus river, application having been made for 150 second-feet of water to be taken out of the south fork of that river. Notice of the application was received by the Oakdale Irrigation District and the directors decided that they would not oppose it, as the proposed diversion would not injure the irrigators in any way. It is proposed to divert the water at Philadelphia ditch and at Sand Bar and run it through a power plant to be erected at Baker's Bridge. This will give the power company a double use of all the water it now has stored in the mountains above Oakdale. The water commission has set a date for the hearing of this application.

MODESTO, CAL.—A meeting of the city council resulted in the adoption by the board of several important measures. A public improvement program, amounting to \$400,000, was agreed upon, and a bond issue for carrying it through will be submitted to a vote of the people early in December. The city attorney was instructed to draw up an ordinance providing for a special election. The public improvement program for 1929-1920 includes an electrolier system and electric police calls, \$20,000; water extension, \$49,000; paving extensions, \$90,000; storm sewer, \$75,000; septic tank and filter beds, \$30,000; sanitary sewers, \$35,000; street department (street sweeper, etc.), \$16,000; Dry Creek Park, \$16,000; aviation field and fair grounds, \$50,000; city hall site, \$20,000; a total of \$400,000.

MODESTO, CAL.—The transmission and distribution system for the power plant that is to be developed in the Don Pedro irrigation project will cost the Modesto district \$238,000, which added to the cost to install the power plant at the dam of \$190,000, makes a total of \$428,000 as Modesto's share. The transmission line from the dam to Waterford is estimated to cost this district \$30,000, which amount is included in the total. Revenues from power and light are estimated at \$126,700 per year, which is over 7 per cent on a capitalization of \$400,000. Of this amount, \$60,000 is to come from the development of irrigated rice lands in this district by electrically propelled pumps; \$43,000 from operating pumps for drainage purposes, and \$18,000 from farm light and power. These figures are but half the power capacity from the proposed plant. The other surplus, it is suggested, can be sold in Modesto, which is fast growing industrially.

THE PACIFIC SOUTHWEST

PALMDALE, CAL.—Engineer Burt Cole of Palmdale Irrigation District is working out plans for building the proposed \$300,000 dam in Little-rock Creek.

VENTURA, CAL.—Concrete light posts will be erected on each side of California Street from Santa Clara Street to 300 ft. of the south line of Front Street.

NEWPORT, CAL.—A special bond election was held October 28th for the purpose of voting on a \$160,000 bond issue for irrigation canals, etc., in the Newport Heights Irrigation District.

SAN DIEGO, CAL.—The city council has adopted a resolution calling for a bond election for the building of the Barrett Dam. \$1,000,000 will be used for the dam and \$200,000 for improvement and repairs to the pipe line and distributing system.

PHOENIX, ARIZ.—Geo. H. Maxwell, ex-director of the National Reclamation Association, together with R. F. Olmstead of the engineering firm of Olmstead & Gates, has organized the farmers of upper Gila valley into a fater users' association. A report will be made on the irrigation investigations in this district.

TUCSON, ARIZ.—Secretary Lane of the Department of the Interior has been authorized to construct a diversion dam on the Gila twelve miles east of Florence at a cost of \$250,000. This dam will serve as a diversion dam for the San Carlos reservoir when it is constructed, and in the meantime will irrigate about 62,000 acres of land in addition to that now in cultivation.

SAN BERNARDINO, CAL.—The Pacific Electric Company will expend more than \$25,000 on improvement of its San Bernardino-Redlands line between now and Jan. 1, 1920, as announced by company officials. Through cars will be run to Redlands from Los Angeles; four cars a day will at first be operated. The present tracks will be torn up and heavier steel rails laid. The car barns at Redlands will also be remodeled to take care of the larger cars.

THE INTER-MOUNTAIN DISTRICT

MACKAY, IDA.—This city plans to install a white way lighting system on its main street at a cost of approximately four thousand dollars.

OGDEN, UTAH.—Business men located on one of the principal streets of this city are petitioning the City Commission to install a white way street lighting system.

BRIGHAM CITY, UTAH.—Construction work was started October 27 on the new white way street lighting installation for this city. The system will be in operation by the middle of November.

SALT LAKE CITY, UTAH.—The Uintah Power & Light Company has just filed articles with the secretary of state, increasing its capital stock to \$500,000. The company serves Myton and other towns in the Uintah Basin.

CHALLIS, IDA.—W. W. Adamson of this city has made application to the Public Utilities Commission for permission to build a power plant and furnish this city with electric service. The Commission will probably grant the request.

WINNEMUCCA, NEV.—Anderson & McShee have been awarded the contract for the concrete work on the new reservoir for fire purposes which the Winnemucca Water & Light Company is building. Twenty-five thousand square feet of concrete lining will be laid.

RUPERT, IDA.—The government has issued notice of an increase in rates for electric service for this city, which is supplied from the government Minidoka plant, of approximately 20% in light and power rates and in heating rates from \$1.25 to \$2.00 per kw. The government has also ordered the segregation of the heating system from the light and power circuits.

BUHL, IDA.—The Farmers' Mutual Light & Power Company have purchased the power site at Clear Lakes from W. C. Hazard for a consideration of \$43,000. The purchase includes the steam engine and all equipment to be used in the construction of a power plant. Work will begin at once and will be pushed to early completion. It is expected that by early spring the farmers on the west end of the Twin Falls tract will be using electric service.



Housewiring and the specification of the architect seem always to have been a bad combination for the electrical contractor. One architect, however, apparently more understanding than other members of his brotherhood, has seen the joke and composed the following specimen:

The title is: Specifications of wire-pulling in connection with a girl's residence in ———.

General Conditions

Objects.—As the primary object of the electrical installation is the amusement of the inmates, the workmen shall use all diligence in regaling the girls with gruesome stories of death by electrocution, whether by lightning, in the chair, by accident or for pleasure. They shall also give them a thorough knowledge of the theory of electricity and enable them to define offhand the difference between direct currents and Valencia raisins.

Board.—The board under which this work shall be done is composed of twenty-four members, each one of whom has a distinct, separate, and different idea as to how the work shall proceed. The contractor, under a heavy penalty, shall absolutely guarantee satisfaction to each individual member as well as to the board collectively. Failure to accomplish this will abrogate any liability whatever on the part of the architect as to the issuance of a final certificate.

Voting.—In the case of a tie-vote between any two, four, six, eight, ten or twenty members, the president shall have the casting vote as to how the work shall be done, after which the workmen will proceed to do it as they damn please.

Foreman.—The foreman shall not only provide heavy bonds, but shall also wear a chain and ball as a repressive measure against his inevitable desire to abduct, elope with, abscond with or otherwise to get away with the pretty secretary of the board.

Treasury.—The treasury will not be guarded. If it is not dishonestly robbed during the progress of the work it will sure be honestly robbed at the conclusion of the job, so in any event the till will be empty.

Soldering Irons.—Soldering irons may be used in connection with the work, but their use shall in no case be diverted to the curling of the girls' hair. Nothing but soft solder shall be used, and to facilitate the smooth running of the job it shall be handed to the matron in large quantities.

Switches.—Only one switch will be required and this shall remain in the hands of the matron for the chastisement of any girl who may attempt to electrify the workmen by flashes from her eyes.

Inspection.—The work, as usual, will be inspected, and if the building be burned down through faulty installation the inspector will require no further evidence that the work is defective, and may order its immediate removal.

* * *

A mere hairpin can be extremely disconcerting at times, as the following story, sent in by one of our San Francisco friends, will show:

"It was just an ordinary hairpin. You can pick up a dozen like it in any block on Market Street. Dislodged from its place of usefulness by the jolting of the street car, it had fallen on the floor of the car, directly over the motor. Playful lines of magnetic force caught it and furnished the several occupants of the car with varying degrees of amusement, astonishment and consternation.

With the application of power, the hairpin rose on end and waved weirdly about, to drop lifelessly to the floor when the controller was spun to neutral.

The two factory girls giggled; the citizen with the pipe and the mortar-crust trousers crossed himself; the dignified gentleman with the tortoise-shell pince-nez adjusted his evening paper to conceal stolen glances.

Our dark-skinned cousin across the aisle viewed the phenomenon with unconcealed agitation. We stopped at a crossing, and the hairpin fell, pointing directly at him; he picked up his pound bag of sugar ready for flight, but held his ground. The controller clicked and the hairpin rose, wavered uncertainly, made a complete hesitating circle, and dropped to the floor as though this time certain of its victim. Worse than broken mirrors! Worse than a dozen black cats! Our dark friend and his pound of sugar left us in the middle of the block."

* * *

The high cost of living seems to have disturbed even nature herself. A farmer's wife in the north of England whose dooryard commands the only approach to a waterfall which all tourists long to see, last year collected toll at the rate of four cents a head. This year she asks six. When asked the reason, she exclaimed, "Waterfalls is gone up."

—And the West planning so many hydroelectric projects, too!

* * *

You hear a good deal about "electrical men"; permit us to introduce one. We hope, however, that you will not allow him to get on your mind, for as a vision in a nightmare we can hardly imagine anything more disconcerting. The idea of "a large gathering of electrical men," also, seems somehow to have lost its appeal for us just at present, in the light of this picture.



JOURNAL OF ELECTRICITY

VOL. 43 NO. 11

SAN FRANCISCO, DECEMBER 1, 1919

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JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

VOLUME 43

SAN FRANCISCO, DECEMBER 1, 1919

NUMBER 11

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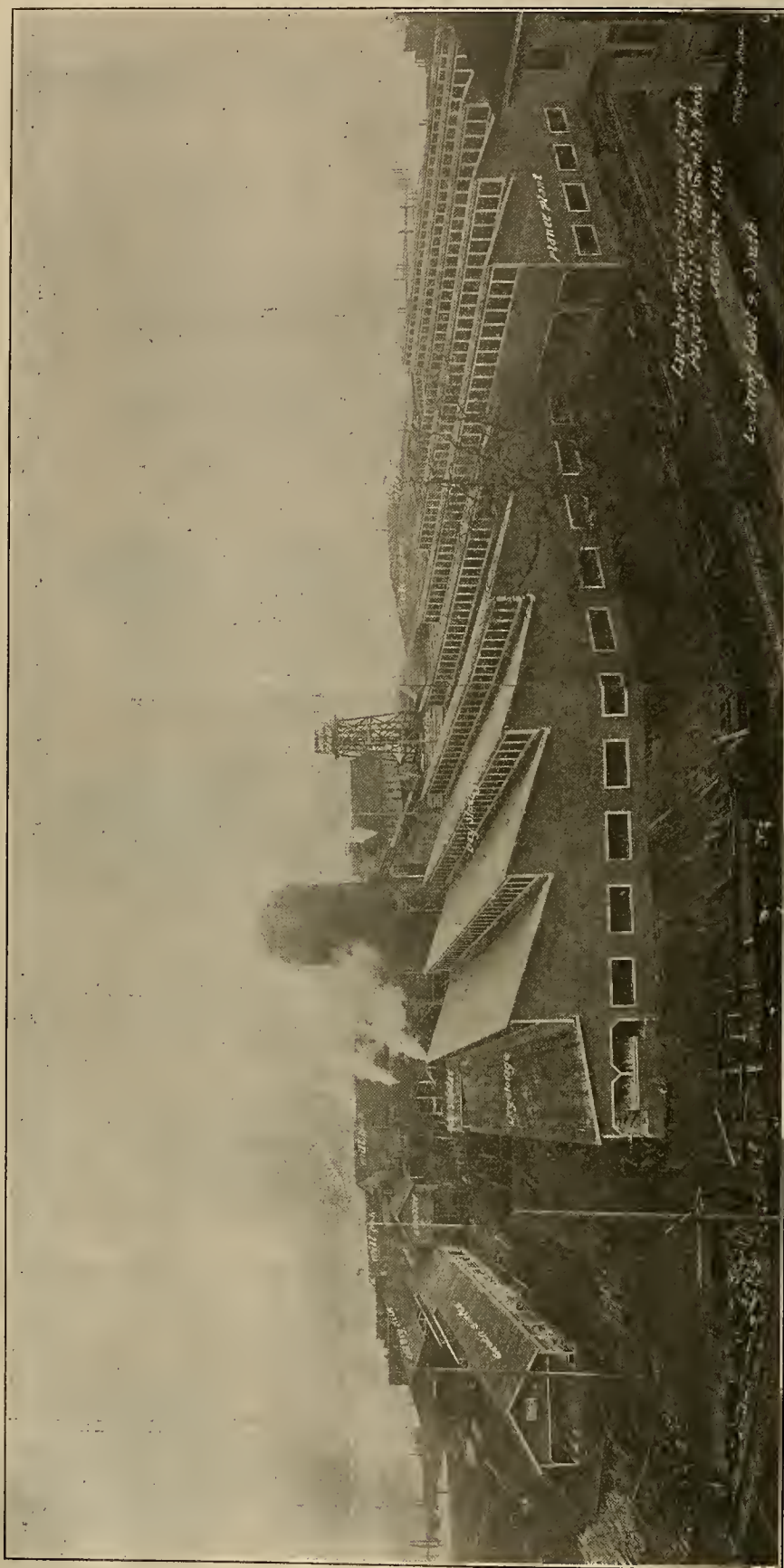
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ALTHOUGH recent years have seen an extensive growth of manufacturing interests on the Pacific Coast, the major industries of this great region must always be associated with the development of its rich natural resources. The increasing use of electricity in agriculture and in the lumber industry, therefore, mark a progress in the vital growth of the region. In the fact that more electricity is used upon the farms of the West than in the field of agriculture in the entire remainder of the United States, and in the widespread application of electricity to the lumber industry lies abundant testimony to the vital service which the electrical industry is rendering to the growth and prosperity of the West.



JOURNAL OF ELECTRICITY



DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43

SAN FRANCISCO, DECEMBER 1, 1919

Number 11

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THANKSGIVING

IN this glad season of Thanksgiving, when the people throughout all our great land are rejoicing in their prosperity, the electrical industry likewise may feel gratitude for the good things of the past year. During the twelvemonth which has seen this country rid itself of the hateful incubus of war, our industry has gone forward united and strong. In its retail and wholesale transactions, modern progressive methods have been perfected; everywhere the "method electrical" is coming into its own in home and factory, and the attitude of the public at large toward the power companies becomes that of healthy confidence. Those who labor in the industry, taking pride in work well done, have remained well content, and their production has gone on unimpaired. With the vast expansion of America's export trade, both in the Pacific and the Atlantic, the output of electrical workshops has gained rich new markets abroad. Engineering and scientific progress, given an impetus by the call of war, continues unabated. Technical journals devoted to the upbuilding of the industry have witnessed remarkable growth. More and more the magic agency of publicity has this year been called on to acquaint the public with electrical methods. Everywhere mutual trustfulness and cooperative helpfulness are apparent; and the shadows of outworn suspicions and rivalries have disappeared before the light of a new day. How can anyone survey the year's work save with supreme satisfaction? May we attain our next Thanksgiving with as much to be grateful for. The "word from the West" is one of optimism and hope for the coming year.

Truly gratifying to all those concerned in the advancement of the electrical industry of the West were the remarks of E. O. Edgerton,

An Encouraging Public Attitude ton, president of the California State Railroad Commission, at the great California Electrical Cooperative Campaign dinner in San Francisco, November 15th. With words of sincere utterance he proclaimed his faith in the future of the industry in this state, and predicted an unprecedented growth in the next decade. R. H. Ballard, president of the National Electric Light Association, had in his splendid address of the same evening estimated that during this ten-year period \$250,000,000 would be needed to finance electric power developments in California; yet Mr. Edgerton deemed this estimate decidedly conservative and stated that it would in all likelihood be exceeded by many millions more.

A great opportunity is before the power companies of California, he declared, and also a great responsibility. The public requires good service always, and if granted that is willing to pay a reasonable price in return. Its attitude is friendly, not hostile; there is no objection to the power companies making a fair profit on their investments. The confidence of the people in the great public service corporations has been heightened by the open manner in which their financial affairs have been transacted.

and Mr. Edgerton expressed the opinion that the public utilities are today the best managed concerns in California.

The attitude of the California State Railroad Commission, thus ably presented by its president, is representative of that of many regulating bodies throughout the West. For some years there has been growing among them a feeling of just friendship toward the public service companies not at all inconsistent with their obligations to the people at large. They have notably displayed a spirit of commendable cooperation with the electric power interests, and have manifested a desire to gain personal contact and association with the leaders of the industry, that they might the more intimately understand its needs.

This California commission, for example, has been busy gaining a first-hand knowledge of all the agencies generating and supplying electric power. Its members, accompanied by officials of the companies concerned, have made thorough tours of inspection over the various systems, with a view to aiding the directors of the industry in their plans for further development. The good results of these purposeful trips are already becoming apparent, and are reflected in utterances such as that of Mr. Edgerton to the representatives of the electrical industry in California. It is sincerely trusted that all regula-

tory commissions are taking a similar broad-visioned policy in regard to the proper development of that electric power which means so much to the upbuilding of the great West.

One of the ways in which contractor-dealers can forward their own technical grasp of affairs electrical will be to send in to the University Extension Division of the State University nearest them, or to the technical press, suggestions as to what is desired in the way of educational aids. Many suggestions have in recent days been sent in to the Journal of Electricity concerning a course in Elements of Electricity that has been appearing in the columns of the Journal of Electricity during the past few months. This course has unquestionably met with great success and has been followed by hundreds of students who have taken this course in many districts of the West.

It is now suggested that a course covering auto ignition, electricity on the farm, the uses of electricity in pumping plants, and other subjects, might well be discussed in a course of instruction to follow the present series. Contractor-dealers having suggestions will do well to send these in at once to the Journal of Electricity in order that proper consideration may be given to them. It is hard to estimate in full the vast good that educational courses of these characteristics will do for the contractor-dealer. A real service to the industry will be rendered by the contractor-dealer taking cognizance of the fact that information is wanted on this important line and his consequent sending in of suggestions to the Journal of Electricity will make possible an increased service to the industry on the part of both the Journal of Electricity and the University.

The normal rainfall for California for November is somewhat over three inches. To date this year, less than one inch has fallen. It is to be hoped that this is not the forecast of another dry year, but at the present time, this portion of the Pacific Coast is undergoing all the effects of three successive abnormal seasons. The mountains are still practically bare of snow and the country is beginning to suffer agriculturally for the lack of rain. In consequence, in a region where three-quarters of the power consumed is ordinarily generated by water power, fully one-half of the output must now be furnished by steam. The present steam installations are inadequate comfortably to meet the demand, and plants are being forced, with the result that there have been occasional complaints on the part of city residents of a smoke nuisance from a plant not ordinarily in any way objectionable.

The situation is one which makes us recognize the necessity of steam standby plants even in the West. California is still hopeful of a wet season—and in any case is sure of sufficient to provide extensive, if not abundant, water power for the coming year. Meanwhile plans are in hand for increasing

steam plant capacities to meet any future needs which may arise.

Both in the convention of the Pacific Coast Section, N. E. L. A., and in the National Association the holding of parallel meetings is to be done away with during the next year. Nothing but big national subjects and subjects of timely interest will be discussed. Subjects in which all branches of the industry—commercial, engineering, accounting, public policy—may express their viewpoint and thus bring about new angles of expression that hitherto have been lacking will be brought up for discussion.

It is true that some of the more important subjects of special interest may be overlooked in this work, and it might be well indeed to plan short sessions off by themselves to discuss more timely, intricate, specialized problems, but on the whole the question of the general meeting is one to be commended and one that will bring out the best thought and effort at a convention that is too short and too brief to handle more than those problems that are of great timely interest and that affect every one in every branch of the industry.

An interesting suggestion has recently come from Brussels for the establishing of a transmission line to extend from Belgium to Italy, a distance of 746 miles. The occasion for the discussion is the great need of Italy for coal, combined with great difficulties of transportation and consequent high prices of fuel. Prof. E. Guarini of Brussels proposes that energy be transmitted in the form of electric current, saving cargo space and costs of transportation. His idea is to establish large generating stations at Belgian coal mines, from which 500,000 to 1,200,000 kw. shall be transmitted at a pressure of 150,000 volts. The astonishing feature of the proposition is that this is to be accomplished by direct current.

Naturally enough, perhaps, no one in his own country seems to take Prof. Guarini entirely seriously. The proposal is one of such astounding magnitude, that it is set aside as not likely to be put into early operation. It is interesting to find that most of those considering the proposition seem to be unfamiliar with recent accomplishments in long distance transmission already in practice in the West. The distance covered by such a Belgium-Italy transmission line would not even constitute a world's record, the Yuma-Wonder line of the Southern Sierras Power Company of California extending for 830 miles across the desert. A voltage of 150,000 has been in successful use on the Big Creek line of the Southern California Edison Company for some time. Indeed, fewer operating difficulties have been experienced on this line than on adjoining low tension systems. The proposal of a 220-kv. line to extend the length of California, over 1,100 miles,

has recently been made without much question of its practical possibility.

Considering the established success which has already been achieved in this country in alternating current transmission, it is rather astonishing to find that this system is not even considered in the discussion. Of course, much wider experimentation and much greater success in the handling of direct current has been achieved on the continent than in the United States. There are many questions such as the alternative cost of developing Italy's water powers to fill the same need, the political difficulties involved, as well as technical intricacies which will probably keep the scheme from ever being tried out, but the mere discussion of this problem from a European standpoint will bring out much of interest to the engineers of the Western United States who have long been engaged in solving problems of a comparable magnitude.

Visual instruction is today being brought more and more before the public as a most important means of carrying home a truth.

The Value of Photographs

As a consequence, the contractor-dealer and others engaged in merchandising will do well in these busy days to take continual photographs of their own establishments and other little ideas they may get throughout their communities and other portions of the business world with which they may be in contact.

Such photographs when kept on file and carefully studied bring out new ideas and new business methods, which will unquestionably prove of great value.

The question of publicity is not to be overlooked. These carefully preserved photographs make possible write-ups in the press that otherwise would be impossible of attainment. One very important function of the trade press is to carry broadcast, throughout every nook and corner of the nation, the good ideas that prevail in the trade. The Journal of Electricity can be of ever-increasing assistance to the electrical industry provided every one in this great industry of ours who is reached by its columns will see that live, active photographs, sketches and ideas are continually mailed in as they present themselves.

There has been considerable question of late as to whether the term "Central Station" as used by the electrical industry is not a misnomer, or, at least, a phrase that connotes to the mind of the general public something quite different from the meaning desired. This is especially unfortunate at the present time when the

industry is endeavoring to impress the public favorably. The vast majority of people outside of the electrical industry have never heard of a "Central Station" in the meaning of "Power Company"—as a consequence their first thought is of the main police station or an institution for the control of public morals. Would it not be best entirely to do away with the use of this term and to substitute the simpler words "Power Company" which will not be misunderstood, nor involve unpleasant connotations?

It will be the constant policy and care of the Journal of Electricity in the future to do everything possible to forward the substitution of this term for that in present general use, and thus obviate any improper visualization that may appear in the public mind when it is desired to show the present day service of the Power Company in its efforts to meet the needs of the public.

When gaining more intimate contact with the public, it may become apparent that the terminology of the electrical industry requires further overhauling. Many people outside the calling have suggested that to the term "Jobber" is attached a somewhat sinister connotation when they first hear it. On the whole, this word, too, seems inadequate; perhaps "Wholesaler" would satisfactorily fill its place.

The California Electrical Cooperative Campaign has decided that it is at all times the best policy to close the shop off from inspection in the contractor-dealer establishment. This is undoubtedly true as a general policy, since by far the major number of contractor-dealers keep their shops in poor repair and indeed in very poor order.

In instances, however, where the contractor-dealer shows an unusual genius in doing his repair work, might it not be well to glass off certain parts of his shop so that those interested in following some of the newer ideas in electrical repair work may follow the genius of the one at work? It is a well known fact that recent bakeries, with shops on well located corners of large cities, have done a flourishing business in exposing the entire bake-shop to the gaze of the public. Idle curiosity, it is true, in many cases may be assigned as the reason for increased gazing in on the work. However, idle curiosity may be vastly capitalized in electrical work as it has in the far less interesting art pertaining to the bakery. It might be well in those cases where electrical contractor-dealers display considerable ingenuity in repair work and efficiency of design to glass in a certain part of this work and make it open to the public. The experiment would be interesting to follow.

IN THE NEXT ISSUE: Publicity in all Branches of the Electrical Industry.

Electrical Logging

BY R. E. GRAY

(The fact that the wealth of the West is derived largely from its natural resources, makes the lumber industry of the Northwest of primary importance to all who are interested in Western development. The contribution which electricity is making, and can make, to this industry, is discussed in the following paper recently read before the Pacific Logging Congress at Portland, Ore.—The Editor.)

The first mention of electricity being used as a motive power on logging apparatus in the Snoqualmie Falls district was made as early as 1914, but it was not until a year or more later that an arrangement was made between the General Electric Company, the Willamette Iron Works, of Portland, and the Snoqualmie Falls Lumber Company, to collab-



Electric yarding donkey used by the Snoqualmie Falls Lumber Company in logging work in the Oregon woods

orate in the building and trying out of an electrically driven yarder.

The proposition was for the Willamette people to build the yarder, the General Electric Company to furnish the motor and controller, and the Snoqualmie Falls Lumber Company to build and maintain the necessary power lines to the yarder and try it out on approval in actual logging.

The yarder finally arrived in the latter part of 1916 and was turned over to the logging superintendent, to be used in clearing ground for a mill site.

The rig was pulled out to where it was to be worked by a steam donkey or locomotive, and rigged ready for operation, but we discovered we had nothing to blow the whistle with as we were without steam. Some of the electricians who were all hanging around to see the circus suggested using a Klaxon horn similar to the horns used on automobiles. This we did with a fair amount of success, but only after we located the horn at about fifty feet distance from the machine, as the sound vibrations of the horn synchronized with the rattle of the gears to such an extent that the donkey puncher did not catch all the signals.

The first trouble we met with was in not being able to control the speed of the machine. The resistance grids furnished to control the speed were designed to operate under load, but the time we needed a slow speed was in tightening the choker and consequently no load on the motor. It was discovered that by starting the motor with the con-

troller handle in the first position and sliding it back between the off position and the first position that the motor would run at a very low speed, the cable just creeping along, giving the hook tender just what he needed. As the motor operated under this condition at a speed that was satisfactory and as neither motor nor controlling devices showed any distress while operating in this manner the electrical department consented to the continuation of the tryout.

The second difficulty met with occurred in the drum controller used to start, stop and control the speed of the motor. The original wiring plan of the controller drum connected the motor stator through the drum contacts with the line serving the motor. This connection resulted in excessive arcing of the drum contacts serving the stator winding and was overcome by installing a 3-pole 500-amp. contactor panel to handle this part of the motor circuit, the operating coil of the contactor panel being energized through the same drum contacts originally used for the stator circuit.

By installing this contactor we got rid of delays caused by burnt-up drum contacts, and having found a position on the drum controller where we were able



Transformer substation of the Snoqualmie Falls Lumber Company, mounted on skids. In the foreground can be seen the submarine cable connecting the transformers with the electric yarding donkey.

to get a satisfactory minimum speed, we were able to finish the job of clearing and observe the performance of the equipment further. It was decided to give the machine a further trial on actual logging in the woods.

It would perhaps be enlightening and in order, at this point, to give a description of the outfit, which may simply be described as an electric driven yarding engine consisting of a Willamette Iron Works Humboldt three-drum yarder with boiler and engine omitted, and a General Electric Company 200-hp. specially wound rotor type, three-phase, 60-cycle, 550-volt motor used in its place.

At this time when it was decided to try out the yarder further on, it was necessary to build a power line from our mill power plant out to the first operation or landing.

We decided for the sake of economy in copper used for transmission, and in view of the fact that if this outfit proved successful, others would be used in the future, to build our line suitable for a voltage of 33,000. Our power plant voltage is three-phase, 550-volt, 60-cycle, and the transformers which the General Electric Company had furnished to be used were 13,200/550-volt with a capacity of 250 kva., therefore we went ahead with this equipment as the securing of transformers had been difficult.

The size of these transformers was considered adequate at least for a test by the General Electric Company and we began operations, using one at the power plant to step the voltage from 550 volts up to 13,000 and one at the other end of the line out in the woods to step the voltage down from 13,000 volts to 550 volts, the proper voltage for the motor.

The first landing was situated 14,000 ft. from the power house, and between them we built a line as stated before, with spacings and insulators for 33,000 volts.

At this time, when the transmission line had been designed and was being built, no tenable theory had been advanced to explain why the motor should run at all with the controller handle in the position we were running on, and it was not long before we had discovered that the motor refused to do the tricks it had done before in running slow enough.

Our electrical department started investigations, beginning on the theory that it was necessary only to add resistance in the rotor circuit until the motor speed was lowered sufficiently, and to rearrange the wiring of the drum controller so as to accommodate a wider range of control. We connected up a barrel of water in each of the three phases of the rotor circuit, varying the resistance in each barrel until we got just the speed required by raising or lowering the terminal connecting the barrel to the circuit.

After adjusting our terminals in the barrels to a place where the motor ran at a satisfactory speed it was only necessary to calculate the watts dissipated in each barrel and the carrying capacity necessary to be obtained in some other form of resistor, as it can be readily seen that to carry a lot of water barrels around with a donkey engine would be out of the question.

Our tests showed us that it was necessary to add a resistance of 3 ohms in each of two phases and a resistance of 6 ohms in the remaining phase of the rotor circuit.

All of this information was forwarded to Portland, where resistance grids to suit our specifications were built up.

After receiving these resistance grids, we found that we were able to control our motor speed to an extent that gave us a range of speed on the main line of from 60 ft. per minute to 300 ft., which has been perfectly satisfactory in regard to the slower speed, but the matter of getting a higher maximum speed is now under advisement.

With the contactor panel installed to take care of the arcing which occurred in the drum controller and additional resistance in the rotor circuit to control the motor speed, we were ready to start off with the exception of some means of signaling.

We overcame the lack of steam to blow the signal whistle by installing an Ingersoll-Rand Company 21½ x 3 air compressor belted to a 3-hp. motor. The air compressor is piped up to a storage tank 30 by 60 inches and the pressure is kept up to 100 lb. This tank is larger than necessary but we used it on account of having it on the ground at the time we were fitting up to blow the signal whistle. By running the motor driving the air compressor about five minutes every hour we are able to maintain a pressure sufficient to take care of all whistling done.

We began to log in October, 1918, with a 250-kva. transformer at each end of the transmission line. The transformer at the donkey end of this line was placed about three or four hundred feet from the spar tree to be out of the way of both yarding and loading.

The 13,000-volt transmission line was terminated on two poles at 8-ft. centers, at the transformer. On these poles furnishing the terminal for the transmission line, a disconnect switch was mounted, making it possible to cut the current off at this point. The current from the 550-volt side of the transformers is carried to the motor through a 3-conductor armored submarine cable, laid along the ground between transformers and yarder motor.



Logging with an electric yarding donkey. The electrically driven yarder logs for 52c. per M. less than the steam driven, and will perform all the operations of which the steam driven machine is capable.

It soon developed that a 250-kva. transformer was too small, the voltage being reduced on ordinary heavy pulls from 560 to 400 volts, which, based on a steam engine working at 200 lb. pressure, would be equivalent to lowering the steam pressure to about 105 lb. Nevertheless during a period of 210 days, completing 9 settings and covering an area of 240.6 acres, 14,883,332 feet log scale of timber was logged, an average of 70,873 ft. per day, with this outfit under the disadvantageous condition of being short of power due to insufficient transformer capacity. It was necessary to extend our transmission line 7900 ft. to reach all of the timber included in the operation just mentioned and 50% of the line was run over logged-off land before the timber was reached.

The cost of building and maintaining the transmission line has been calculated on a basis of 5% depreciation for the copper conductor, 20% depreciation for cross arms and insulators and 100% for labor and incidentals.

A total of 21,900 ft. of transmission line was built to get the 14,000,000 odd ft. of timber, and as 12,000 ft. of line was taken down to be used on other extensions, the cost of building and maintaining the transmission lines has been arrived at by using the percentages of depreciation mentioned on 12,000 ft. of line. This added to the cost of maintaining the motor and controller, shows a total cost of 11c. per M.

This is a very conservative estimated cost, for possibly never will we find it necessary to build and take down as much line again to log off 14,000,000 ft.

In comparing costs of logging with electricity and steam it is found that the electrically driven yarder logs for 52c. per M. less, a total saving of \$7,280.00 in 210 days on a yarder alone, and it is our opinion that this saving would be more than doubled if an electric driven loader were used in conjunction with the yarder.

In this case, no water whatever would be necessarily provided and all the other incidental maintenance costs, such as train crew services delivering fuel oil, cleaning flues on Sunday, watchmen to put out fires, etc., for then the fire hazard would be practically wiped out.

At present 32,150 ft. of transmission line has been built, 12,000 ft. taken down, leaving 20,150 ft. standing.

The question of the line crew being able to keep ahead of the other operations at first looked as though it would be quite a problem, but taking into consideration that 32,150 ft. of line has been built in sections of 14,000 ft., 7,900 ft., and 10,250 ft., 12 settings having been made and the yarder crew never delayed a minute, and this with only about 3,000 ft. of line material surplus, we can consider this another difficulty connected with electric logging, met and overcome.

To go back to the matter of transformer capacity, it had been demonstrated that 250 kva. was not enough. At present, three 200-kva. single-phase transformers are being used to step the line voltage up to 13,000 volts at the power-house and the two 250-kva., 3-phase transformers are being used in the woods to step the voltage down to 550.

It was found that it required about half a day for four men to set up the transformer in the woods every time the yarder was moved to a new setting. This has been cut down to about one hour for one lineman by mounting the transformers on a small sled, a structure being built on the sled to support the incoming line wires and disconnecting switch, which is never taken down.

Beginning September 2nd, and during twenty-four days' actual logging with ample transformer capacity, and two "Wobbly" walk-outs thrown in, the electric yarder has logged 1,782,339 ft., an average of 77,500 ft. per day, off a tract of 30 acres. This shows an increase of 7500 ft. above the average reached when running with insufficient transformer capacity. The largest amount of logging ever done up to date by the electric yarder in one day is 186,909 ft.

In its present stage of development, the electric yarder is showing results equal to a 12 x 14 Willamette at a cost of 52c. per M. less.

It might be well to mention that the General Electric Company finally explained that the reason for the motor's running at all with the secondary circuit open was because a feather edge had been left across the slots in the rotor, thereby allowing eddy currents to rise sufficiently to produce enough flux to furnish a small amount of torque revolving the rotor slowly. This is very possibly the explanation. Anyway the eddy currents did not eddy after the machine had stood idle a few months, the feather edge of steel probably rusting off. At all events we were forced to add from 3 to 6 ohms resistance in each phase of the rotor to get the speed down, and as this worked out, we have never followed up the question.

The yarder has been developed to a degree where it requires a small amount of maintenance, in fact has run 234 days without a single shut-down for repairs to any part of it, electrical or otherwise. The renewals that have been made have been done during shut-downs at noon or on Sundays and these were only minor items, mostly drum controller contacts.

The machine will do all the stunts a steam driven yarder will do, such as load itself, tighten up guys and the control, while not being in our opinion perfectly safe to raise and lower a rigger on the spar tree.

It has been proven that 250-kva. transformer capacity is not enough, that 500-kva. is enough, but how much more than enough we cannot at this time say, not having had the time to test the peak load necessary to do the heaviest pulling the yarder is called on to do.

Tests have shown that it requires 2.8 kw-hrs. energy input to log 1000 ft. Up to the present it has required the building of 32,150 ft. of transmission line to log 16,665,671 ft. of timber off 270.6 acres in 234 days.

It is safe to say now that if the electric yarder had reached a stage of development it now has reached, at the time equipment was being purchased for our logging operations, at least one of the two camps maintained here would very possibly have been electrified.

Changing a Sawmill to Electric Drive

(The importance of the lumber industry to the Northwest makes modern developments in the sawmills of that region of especial interest. The change to electric drive is the most prominent feature of this development at the present time, and the installation described below is one of the more recent examples of the changes which are being effected.—The Editor.)

The changing of sawmill plants from steam to electric drive goes steadily forward in the Northwest. A conspicuous example of this process is found in the case of the Puget Mill Company at Port Gamble, Washington, where the Standard Electric Company of Seattle, under the management of Herbert C. Moss, is carrying out a contract for changes from steam to electrical equipment amounting to about \$30,000. This installation is typical of that of numerous sawmill companies in the Northwest with plants beyond the reach of central station electric

can be operated either independently or with the other. The 200-kw. turbine will be used principally for operating the lighting system at night when the larger machine will be shut down. There is enough reserve capacity in this generator to operate a number of the planers or other machinery on night shift without running the larger generator.

Motor Equipment for Planing Mill —

There are six large planers with 50 to 75-horsepower motors, and there is an extensive system of transfer and sorting chains for carrying the lumber from the two sawmills to the planing mill, a distance of some 600 feet.

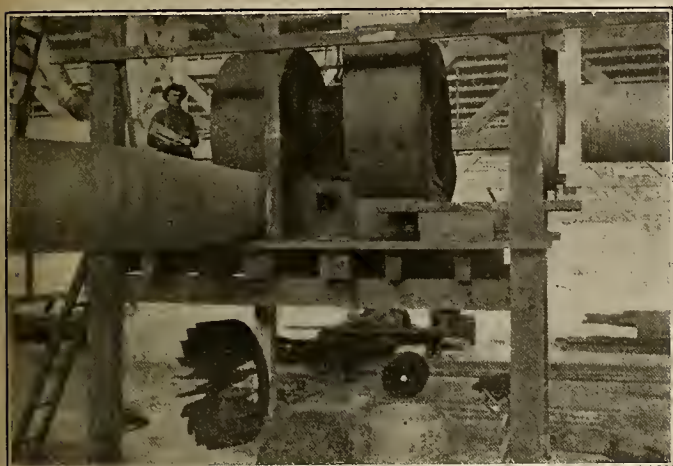
The blower system which carries shavings and sawdust from the planing mill is operated by a 200-horsepower Allis-Chalmers induction motor on which a special double extended shaft was pressed and which operates fan blades on each side of the motor.

The distribution panels supplying power to the planing mill are equipped throughout with Economy renewable fuses. The entire equipment, with the exception of the fuses, was supplied by the Allis-Chalmers Company.

Extensive Improvements —

The mill will be equipped with a modern lighting system this fall. The company will rewire the town of Port Gamble, and many of the houses now without electricity will be equipped with lights and modern appliances.

Old direct current motors will be taken out and disposed of and a few small motors in the hotel,



Blowers with Allis-Chalmers motor and double extended shaft, in the Puget Mill Company's plant, Port Gamble, Wash.

power. In such cases the operation of a steam-electric plant in which all mill machinery and shop tools are motor-driven and in which sawmill refuse is utilized for fuel, proves the most economical and efficient.

Generating System —

There are two independent sawmills in the property which have been operating continuously since 1854. In these the old steam-boiler installations will continue to be used for driving the Allis-Chalmers 1000-kw. turbo-generator. Electric energy produced in this way is to be used for operating 75 Allis-Chalmers motors with a combined capacity of 1250 horsepower, for driving saws, blowers, transfer chains, shop tools and the machinery of a new planing mill.

The head saws of each of the two sawmills are being driven by a 300-horsepower slip-ring Allis-Chalmers motor and are operating in a far more satisfactory manner than they ever did with steam.

The company has purchased a 200-kw., three-phase, 440-volt Allis-Chalmers turbine to be delivered early this fall. This turbine will be tied in on the busses with the 1000-kw. machine, and switching arrangements will be made so that each machine



Installation of motors and starters on planers. There are six large planers with 50 to 75-hp. motors.

operating pumps, ice machines, etc., will be taken out and replaced with alternating current motors.

The Standard Electric Company have had entire charge of the construction work in this plant.

Electricity Contributes to



A BEAUTIFUL MUNICIPAL CHRISTMAS TREE AT SAN DIEGO
WITH A FAIRY-LIKE EFFECT OBTAINED BY
ELECTRICAL ILLUMINATION

the Community Christmas



No city's Christmas is complete without its community Christmas tree. The fine municipal trees here shown owe much of their decorative beauty to the varied effects obtainable by electric lighting, the other adornments playing a minor part in the scheme. The use of colored globes of different degrees of opacity gives all the variation in lighting that could be desired.

The addition of small sparkling objects to refract the light is all that is required to produce effects just as remarkable as could be obtained from a far more expensive and elaborate scheme in which the electrical illumination played a less important part.



The 150-ft. San Francisco tree in the center is not a single tree as it appears but is built up on a tall flagpole. The star at the top is at the point of the pole. The decorations consist of slim rolls of white paper, giving an excellent illusion of candles, coiled shreds of tin which make small shining spirals, and a number of the colored glass gems from the Tower of Jewels of the Panama-Pacific Exposition. It can easily be seen that decorations of this kind are comparatively inexpensive, though the result was effective out of all proportion to the expenditure. The credit for the very graceful tree at the right goes to the city of Portland, Ore.



Do It Electrically, Santa Claus!

(What are you doing for Christmas? It is prophesied that this year will see a bigger sale of electrical Christmas gifts than has ever been known before, and manufacturers all over the country are making special holiday plans. Below are some of the ideas of the Western Electric Company of San Francisco.—The Editor.)

Besides the usual stuffers for envelopes, window displays, counter stands, and other details that, carefully used, merge imperceptibly into a well-conducted campaign, the Western Electric Company offers various new holiday features in recognition of the enormous demand for household appliances, a demand which it has preached for several years and which it has done a great deal to foster.

One of the new features is a 32-page booklet, entitled "Sales Promotion Service—The Value of Power Is in Its Acquirement," the sheets being 11 by 14 inches in size and containing spaces for samples of the various kinds of advertising matter on household appliances issued by the Western Electric Company, together with a brief description of the devices themselves. Thus the book becomes a valuable counter-reference as well as an advertising order book. The book is divided into sections under the heads of various devices, such as Western Electric Washing Machines, Western Electric Vacuum Cleaners, and the like, and under each section is a sample of each stuffer, pamphlet, display card, lantern slide, and window display, arranged by code numbers so as to facilitate ordering.

Another device is a specially designed letterhead and envelope showing several unhackneyed pictures of appliances in service. These letterheads will be furnished at a nominal cost to dealers, and if necessary will bear a multigraphed circular letter prepared by the local office of the Western Electric Company, or by the dealer if he prefers, or by a combination of the ideas of either.

There is also a series of crisp circular letters which are designed to catch the eye at the outset, and maintain the interest up to and including the paragraphs describing the devices. Here are a few of the introductory paragraphs of the letters:

I

When Rip Van Winkle descended from the Catskills after his sweet sleep of twenty years, he found that his mind as well as his joints had grown rusty and that everything seemed unreal and strange.

It would take just one-twentieth as long to put him out of date in this Age of Electricity, so rapidly does change follow change, and each invention makes electricity more indispensable. "What is a dry year?" inquires the farmer who owns an electrical pumping plant. "Who said drudgery?" asks the housewife who cooks, irons, washes, sews, sweeps, and washes dishes by electricity.

II

On Christmas Eve, 1914, English and German soldiers crept out from their dugouts and trenches to meet on No-Man's-Land, where they fraternized for a few hours and smoked and sang together like jovial friends. Bombs, bayonets and shrapnel could not daunt these men. They surrendered to the spirit of Christmas.

For Christmas will always represent a season of good cheer, and of giving. It is only the character of the gifts that is changed. Foolish, flimsy trifles are banned; useful, more serious presents are the rule. You can see by the suggestions enclosed that they can be artistic, too.

III

Morse invented the telegraph in 1844, Bell the telephone in 1878; the first long distance transmission line was placed in operation in 1901. That is electrical HISTORY, but the modern commercial electrical business in which we are engaged is younger than the century—it is under draft age.

IV

The cook-lady and her adventures enroute to Lonesomehurst, have always been good for a laugh anywhere, but the joke is on us when employment agencies rate her and washer-women at \$2.00 to \$2.50 per day plus car fare and meals. No wonder the housewives are paying REAL attention to ranges, vacuum cleaners, washing machines, who never talk back and pay their own way.

In brief, the Western Electric Washing Machine will wash efficiently; with proper care will last a life time and save the cost of a whole harem-full of servants.

Remember, the public is going to buy washing machines whether you sell them or not. The question is, are YOU going to jingle this money in your own pockets, or let it get away to total strangers?

One other special feature of this advertising is the use of a new paster, size about 3 1/4 by 6 inches, and gummed at the left hand side. This paster may be used in many novel ways, or it may be attached to statements, bills, or even packages or doorsteps if necessary. When attached to a package, each bundle becomes a traveling ad for the dealer, for there is a space on each paster for the dealer's name, address, telephone number and whatever legend or slogan he chooses to adopt.



This specially designed letterhead and envelope, in pale blue, has been prepared by the Western Electric Company as one of its holiday plans for promoting the sale of electrical appliances during the Christmas season.

Potential Publicity

BY S. M. KENNEDY

(In the first part of this article, appearing in our last issue, the author dealt with specialized newspaper advertising. Below he takes up the more general forms of advertising—billboards, electric signs and motion pictures—together with the preparation of advertising copy. This concludes the third article of this series by the general agent of the Southern California Edison Company.—The Editor.)

There is a class of advertising which is not designed to have a direct selling quality, and which is intended to educate the public into greater use of electricity and give information concerning the advantages of high grade electric service. Such advertising to be effective, should make definite statements and not deal in platitudes. For educating the public to appreciate better lighting service, there are many arguments, among them the greater efficiency



A great deal of the advertising done by electrical concerns at the present time is directed not so much towards immediate sales as towards the general education of the people in the use of electricity.

of new types of lamps and their placements so as to produce the greatest amount of illumination for the smallest expenditure of current. In advertising power service, such definite arguments as the advantages of the individual drive as against line shafting friction, is illustrative. It is well to announce that the company's illuminating engineers and power experts are always available to take up with consumers the details of their individual problems. In advertising the advantages of electrical appliances, the free services of demonstrators may be announced.

Simply to advertise good service, or to claim that your service is the best service, is manifestly stupid if you do not give some tangible reason for the assertion. The unsupported proclamation savors of the man who professes himself a fine fellow, but does not back it up with any demonstration or performance. There is an antique which runs something like this: "If our service is satisfactory, tell others; if not, tell us." There is no logical reason why a consumer who is forced to borrow a candle because his lights grow dim, should make a profound secret of the reason for the borrowing. It would be well for him to hand in his complaint to the trouble department of the corporation which exists to furnish him good lighting service, and if the service is usually excellent, it might be of advantage to the company if the complainant tells his neighbor that this particular trouble is the first he has had for many a day.

Being Frank with the Public

The necessity for what was termed "political advertising" has practically passed away in states where electric rates are regulated by Public Utility Commissions. Occasionally, however, there are communities where rate matters and other questions affecting utility corporations become subjects for public discussion. In such cases, it is the duty of the utility company to tell the people frankly through the medium of its newspapers, all the facts which enter into this contention, and to do so by the free use of advertising space. Emergencies of this kind are in the nature of campaigns, and should be vigorously and fearlessly conducted by the utilities. To rush into print with a kind of advertising which was formerly termed "public utility advertising" when no controversy exists is apt to "sow the wind and reap the whirlwind." A public utility advertising expert who has made a study of practically every series of the class of advertisements referred to, that have been offered utility companies during the past decade, has divided such advertising into two classes—the "boastful ad" and the "whining ad." The first kind when put under analysis simply tells you how wonderfully good the company is and is prone to provoke discussion by those who do not relish the laudation of corporations. That prolific writer, Pro Bono Publico, has a liking for basing letters to the editor upon these boastful announcements, and the company that prints them sometimes finds that it has started something where nothing exists. The whining or hard luck ad, which tells us what a miserable time the company is having to eke out an existence, is not cheerful reading matter or encour-



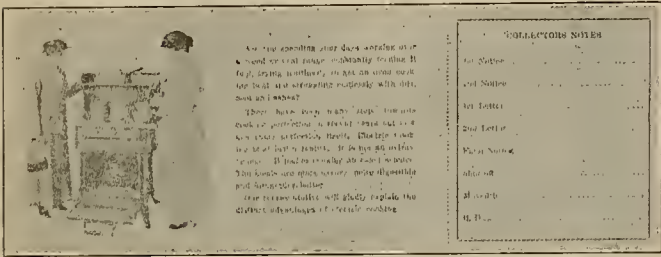
This clear-cut advertising card announcing the company's representative, arouses the interest of the housewife and prepares the way for the electrical salesman.

aging to stockholders, and its psychology is to produce sarcastic comments. The farmer is beset with weevil in the wheat, the orchardist with the scale, and the merchants who have troubles of their own

are prone to remark that if the public utility man does not like this avocation, let him go into the balloon business.

Electric Signs and Billboards

Electric signs are the latest, and without question the best method of what can be termed stimulative advertising—the class of advertising which by brief, concise statements emphasizes a fact, and often induces the reading of the more elaborate an-



Advertising on the backs of bills, if judiciously used, carries a useful message to a selected list of persons who are already users of electricity. The cost of this kind of advertising is very small.

nouncements in the advertising pages of the newspaper. The electric sign writes its story on the night and is seen where printed signs would never be noticed. One of these signs, which originated in Los Angeles, flashes a slogan which tells the story of electrical advertising. It has since glowed on the Palisades on the Hudson overlooking greater New York, has been used in many large cities, and illustrated in a well-known advertising magazine. It reads, "Night Signs Bring Day Business." The central station has a direct interest in stimulating the use of electric signs—and in this respect should be a good patron of its own product. An electric company can well afford to use electric signs on its stations, sub-stations, garages, warehouses and all its offices, and such use will stimulate others in a community to do likewise.

Billboards are very effective for stimulative advertising and much more so if electrically illuminated. The newest uses to which they are now devoted is to call attention to advertisements which are to appear in the issue of the daily or Sunday newspaper. They should contain but a few words, and these must be so largely displayed that they can be read from across the street, or by those riding in passing street cars. If they are typed too small they are worthless. Street car advertising is an excellent means of communicating brief, pungent statements. People have plenty of time while they are riding in street cars to read the advertising cards and they usually do so. Such advertising is sometimes productive of surprising results.

Using the Backs of Bills

Advertising on the backs of electrical bills may not be considered high grade publicity, but is useful for certain promotion work. The cost, however, is almost infinitesimal in proportion to the large distribution, and may be considered an advertising by-product which should be conserved and put to the best possible use, by carefully preparing the copy. This method of reaching consumers should not be overlooked or wasted any more than are the coal-tar or lamp-black utilized as by-products of a gas plant,

or residuum at an oil refinery. Theatre programs have merits as auxiliary advertising, but they must be regarded the same as church catalogs, hotel register advertising and that entire class of publicity which reaches only a very limited number of people—and simply touches spots in a community. To use an electric metaphor, it has a low load factor and it bears the same relation to a comprehensive advertising plan as the massed cluster lights did to modern street and highway illumination.

Advertising Copy

In the preparation of advertising copy, the first consideration is to make a strong, forceful announcement, typed in sufficient size to catch the eye. To visualize an advertisement, it should be prepared so that the words which are used to impress will stand out in bold type. The connective lines can be cut down to very small type as they are merely there to make the legend consistent and grammatical. If the main statement catches the eye, the advertiser can consume a great deal of space in type no larger than the text of the paper, and be practically certain that it will be read. A very good form is to place these small text announcements in a one-column box in the advertisement. The displaying of an advertisement should not be trusted to dashing a few pencil marks under the words which are to be printed in big type. Type is all made in standard sizes, the height being measured in points. A type-book, available at any newspaper office, gives specimens of these types, showing the height, width and number of letters that can be made to fit into a column line.

An advertisement for The Edison Electric Service. It features a muscular man in a dynamic pose, holding a large sign that reads "The Edison Electric Service Is the Strong-Arm behind all Activities". Below the man is a newspaper clipping with the headline "Electric Meters Register Prosperity" and a sub-headline "Southern California Edison Company". The clipping also mentions "New Edison Building" and "Prosperity in the City". The overall theme is one of strength and prosperity.

Advertising copy needs the most careful preparation, with a forceful announcement or picture to catch the eye, and the supplementary details in smaller type. It is worth while to spend a great deal of time in preparing an effective advertising card.

By taking one of these books, and working out the typing of an ad on the point system, the exact result desired can be produced instead of leaving the important matter of display to the chance choice of a compositor. It is usually best to type ads in one series. Breaking series gives printed matter the same look as a letter penned in the handwriting of

several persons. It implies utter ignorance of the art of printing and has a haphazard appearance. The illustration of advertising can do much to improve its effectiveness. It is a part of the business, however, on which many copy-writers go wrong, simply because they have not the necessary knowledge of the technique of reproduction and photo-engraving. Most photographers are unfamiliar with reproduction processes, and do not know how to take photographs so that they will reproduce at correct angles and proper perspectives.

The central station manager must not overlook the value of folders, circulars and follow-up letters. These are all effective for special educational and promotion purposes. The fact that they may be mailed to selected lists of prospects or consumers ensures their getting into the hands of those who are likely to be interested, and because of this, satisfactory results may be reasonably expected.

The Possibilities of the Motion Picture

Motion picture or film advertising is destined to become a great factor in publicity. It has possibilities of being educational in the highest sense and its scope seems sufficient to include all of the other classes that have been touched upon. But as yet it has not been worked out or reduced to anything having a semblance of system. The obstacles which stand in the way of its general use are these: Large moving picture houses that run five-reel features, and short comedy, and are now supplementing the entertainment with vaudeville and musical attractions, are cutting out the travelogue and educational pictures, and will not use any film that has even an indirect advertising announcement. The neighborhood and rural picture houses will accept educational films with a small amount of advertising included, and if the picture is good many of them will present it without any charge. It would be necessary to run a film through all of the neighborhood and rural theatres in a community in order to give it a general publicity value, and this cannot be accomplished under any of the present releasing arrangements. It therefore follows that money expended for a film without some system of having it displayed, is more or less of a venture. Whether or not the electrical industry can evolve some particular method of film production which will take it out of the class of small spot advertising is an interesting problem, and worthy of careful thought. The cost of producing one negative of a commercial film ranges from one dollar per foot up. Exteriors such as power plants, hydraulic installations and out-door lighting effects cost the camera man's time and the price of the film, including its development. In some respects the moving picture, as an advertising medium, has no equal and there is no business that can use it to greater advantage than the electrical industry. The electrical business is essentially active and aggressive—it spells activity in all its uses. The motion picture can represent action better than any other advertising means—it is activity personified and is destined to become one of the great mediums for telling the electric story of ease, comfort, economy, health and hope for all.

Each type of advertising which has been referred to must be sincerely honest, and have proof for its underlying principle. Fake advertising is always a boomerang. It pays to advertise only when the advertising is truthful, for "above all things truth beareth away the victory."

Advertising and Development

The well operated central station company makes an advertising appropriation at the beginning of each year. Of the total appropriation, experience has indicated that approximately seventy-five per cent can well be spent in newspaper advertising, and the remainder distributed among the other mediums and methods mentioned. The amount of this appropriation depends upon the amount of intensive or extensive developments desired—and this development often depends upon the funds available for additions to plants and extensions to distributing systems. Intensive development does not require the additions to capital expenditure that are required by extensive development. Intensive development represents greater earning from present investment—and as a means to this end, nothing produces more direct results than the timely use of carefully prepared advertisements, followed up with personal interviews. To the central station company advertising may be made as effective as in any commercial enterprise. Stereotyped, unproductive advertising should be eliminated without loss of time, and the money heretofore wasted in this manner should be invested in such known methods of publicity that will produce satisfactory results.

\$50.00

FOR A NAME

We are about to open an Electric Store at

133 Tenth, Near Alder

and want a suitable name for it. Fill out the following blank and mail it in.

FURTHER

We will allow any one who turns in a name a \$50.00 credit slip on any Washing Machine, Vacuum Cleaner, Mangle or other appliance which we handle listing \$50.00 or over if purchased within 30 days from date.

SHOULD THERE BE MORE THAN ONE

send in the name which we select the \$50.00 will be divided. All replies must be in by 6:00 P. M. October 29.

Store name.....

Your name.....

Address

Mail Answers

133 Tenth, Near Alder

Store Opens October 30th

The above announcement heralded the opening of a retail store by Geo. A. Humler, for several years Portland representative of the Edison Lamp Works. The winning name was "The Electric Maid," and the store is now known under that title.

Standards of Service in the Public Utility

BY JOHN D. KUSTER

(The twenty-four-hour man, the requirements and responsibilities of the public utility, and its employees, and the ideals towards which they are working, are taken up in the following excerpt from an address delivered recently before a convention of the Pacific Coast Gas Association. The author is manager of the San Jose branch of the Pacific Gas & Electric Company.—The Editor.

With the average rise in the past six years in this country of 91 per cent in the retail price of the actual food necessities of human existence, the salaried man and the wage earner have been busy in the science of high finance.

The salaried man or woman not a mechanic, and not a part of a labor organization belongs to the class of workers that is deserving of attention. If he has had an increase, it has probably not averaged more than 15 per cent, while the men under him have had increases of 50 per cent. He is the man whose shift is limited to twenty-four hours a day, and three hundred and sixty-five days a year. On duty always when needed, and sleeping with a telephone at his pillow, he carries on his shoulders the responsibilities of his company. He defends it against all criticisms and unselfishly glories in its success. He is called out nights, or holidays without a thought for overtime. He is loyal through strikes, despises dishonesty wherever he sees it, whether in the form of laziness of a worker on the job, a collector short-changing a customer, a traveling inspector padding an expense account, or a complaint man accepting a tip. Organized labor takes care of itself, but the salaried man is sadly overlooked. He has the right to an annual income that will enable him to live well, buy a home with a few acres, permit him to educate his family, and by reasonable thrift and economy lay aside enough to enable him to make a living out of his little farm when "Old Father Time" hands him the "blue envelope."

Responsibilities and Privileges —

The employees of public utilities generally, come in closer contact with the public than the employees of factories or other industries. They are required to be courteous and polite, under irritating criticism from persons unable intelligently to criticise the service, rates or operating rules of the company.

The very nature of public utility work requires strict discipline and positive accuracy and reliability. For this reason the employees of all utilities should be better paid, should work shorter hours, should be better housed and have better working conditions than those of other industries. They could then be more carefully selected and permanent employment with the utility would in itself be a certificate of character and ability that would be a valuable asset.

Whether unionized or not, they should not be denied the right of collective bargaining if they desire it, and all disputes and differences that may arise that cannot be settled by representatives of the workers and employers, should be referred to the public utility commission whose judgment should be final, and who have the authority to make rates to justify generous treatment. The public are not

concerned in the disputes that arise, but they pay for a service which the utility is obliged to render, and any person accepting employment with the utilities obligates himself to assist in making that service perfect. He forfeits his right to strike, or to even absent himself temporarily from duty without knowing that a trained employee is ready to take his place.

Maintaining a Balance —

It is ridiculous for employees to feel that industries exist for them alone, and it is just as absurd for owners and bankers to think that they are the favored ones of God's realm, and that all good things were provided in order that their families may enjoy leisure and all the luxuries of an extravagant existence.

If the banker or owner works six hours a day and five days a week, counting a game of golf Wednesday afternoon, it is little wonder that his employees question why they should work ten hours a day and six days a week. If the owner takes his living out of the business each month, and a substantial dividend from the profits at the end of the year, I am not surprised that the worker yearns for a share in the year's profits, as his monthly wage has been barely a scant living. He too wants a savings account, to sustain his old age.

When a factory pays its laborers \$5.00 a day, and a twenty-four-year-old boy president of the concern \$125,000.00 a year, there is an inequality out of harmony with the American sense of justice. To my mind these are the biggest questions before the world today, and the very fact that owners are beginning to show a willingness to discuss them and correct them, are evidences that they will be peaceably and justly settled.

The employer and employee must both learn that each has rights which will bring greater prosperity to all if these rights are respected.

The wage earner is principally concerned in what he calls a more equal distribution of the profits. He forgets that frequently there are no profits, but he gets his wages just the same, and his employer pockets his loss and says nothing.

The Ethics of Industry —

He is concerned in shorter hours, better working conditions, accident compensation, health insurance, and safety laws, all of which the employers are beginning to accept. The one vital principle the employee has not yet learned is that careless inefficient workmanship, loafing on the job, curbing output, incomplete knowledge of the work to be performed, just "getting by on a bluff," disloyalty and indifference to his employer's interests are all forms of dishonesty, and are destructive to the prosperity

of an industry, the reputation of a public utility or the life of a nation.

The correction of this evil in adults can be accomplished only by personal reward in some form; yearly bonus for continuous service; frequent promotion; cash prizes for evidences of extraordinary skill; public acknowledgment of superior skill or talent; selection of skillful workers as instructors of those less skillful; encouragement to study at home or in night school in subjects allied with the daily work. To prevent the continuation of this fundamental error in the rising generation, we must enlist the service of the public schools. Education in its broadest sense must be compulsory and vocational, they must be taught to work with the hands, and when a boy is physically or mentally unfit for a mechanic or an agriculturist, it is time enough then to try to make a lawyer out of him, but the selection of his vocation or profession should be made by a board of vocational experts, and not by an indulgent mother or a whimsical maiden aunt.

If this nation is to compare favorably with other nations, its industrial and mechanical engineers and chemists must write into the patriotic exercises of young and old something more than singing the "Star Spangled Banner;" they must breathe into the souls of young men and women through home influence and school training, a yearning for knowledge and superior skill; discipline and obedience; an enthusiasm for thoroughness; a heroic worship for creative imagination in work to improve industry; and a realization that any vocation or trade becomes a profession whenever a worker puts a sufficient amount of knowledge, skill, enthusiasm and imagination into his work.

A public utility, monopolistic in its function, as it should be, practically guaranteed a reasonable return on its investment, seems to me to be the ideal institution for setting the standard of conduct, for both owners and workers; for character building and citizenship; for work and recreation; and for the security of the health and old age of its men and women.

Caring for the Stock

(How much delay, inconvenience and deterioration can be put down to lack of system in the storing and handling of stock? The following account of the methods of the Pacific States Electric Company describes some of the efficient and orderly devices employed in the stock-rooms to ensure the best possible service in filling orders.—The Editor.)

The first impression is often the one which determines the character of the relations which are to follow. A concern in which all details are neat and orderly is recorded in the mind of the customer

and without confusion, and obviates loss of material through careless handling or deterioration on the shelves. Similar plans are carried out in each of the branch offices, although on a somewhat smaller scale.



The stock rooms on each floor are wired in a different manner and constitute virtually a wiring exhibit. The illumination of the different sections of the floor is independently controlled.

as a satisfactory, business-like place with which to deal and he approaches all further transactions in this frame of mind. With this aim of a favorable first impression, the San Francisco office of the Pacific States Electric Company has worked out a detailed system of caring for a stock which often mounts up to seven and nine thousand items. Store rooms and shipping departments are as orderly as the offices and display rooms. Incidentally, this system is one which enables orders to be filled promptly

Boxed Material —

Several floors of the six-story building on Mission Street, San Francisco, are given up to storage of stock, in general the lighter materials being handled on the upper floors and heavier materials lower down. An ingenious system has been worked out for shelf storage by the use of boxes of a uniform size, on the principle of the sectional book case. These shelves run longitudinally of the building with sufficient space between to permit of the storage of boxed material in the aisles and still leave adequate room to move about. No open cases are permitted on the floor. As soon as a box is broken, its contents are removed to the shelves directly opposite. This material in turn must be wrapped. If it does not come wrapped or in boxes it is properly protected before being placed on the shelves. The mass of the stock, therefore is piled in regular order down the aisles in unopened cases, with smaller lots of the same in the shelves directly opposite.

Sectional Box Shelving —

The use of boxes has been found extremely satisfactory. Originally wire boxes were used, but more recently heavier boxes of a uniform type have been made which are used throughout the building. The average box in use is about 36 inches long by 15 inches high, but for larger materials a box of double this height is used. Where materials are very small and a bin is necessary, as in the case of screws and the like in the line of hardware, a board

nailed across the lower half of the box converts it into a convenient receptacle.

These boxes piled evenly back to back form a set of shelves facing both aisles of very neat appearance. In addition they are extremely flexible, being



The packing department is in the basement, conveniently located for the trucks. A moving wrapping platform is used to obviate the necessity of moving goods from one part of the room to another.

easily taken down or built up as needed without the necessity for calling in a carpenter. They have been found to be far more durable than shelving. Some of the boxes now in use in the San Francisco branch, in fact, were brought over from the Oakland division directly after the fire and have undoubtedly been moved several times since, but are still in perfectly sound condition.

For certain types of materials, of course, racks resembling pigeon holes are necessary and these have been painted white over their front surface to permit them to be plainly marked with sizes and other required data.

A Wiring Exhibit —

Lights are provided adequately throughout, the illumination of each small section of the floor being independently controlled in order not to waste electricity. The wiring itself is of particular interest, each floor being wired in a different manner, one with rigid conduit, another with flexible, one with knob and tube—and so on, to illustrate the various types of material from their stock as they appear in use.

Convenience in Inventory —

Materials, of course, are stored according to their type, all sockets and the like occupying one division, for instance, small household appliances another. For convenience during inventory each floor is divided into several of these sections by white lines painted on the floor, much as the divisions on a tennis court. All one type of material is stored within such an area and in taking the inventory each is cleared up in turn. This system also makes it very simple to fill an order. With a floor plan of the sections on each floor it is possible for even a green hand to locate materials without inconvenience. In fact, it is possible to mark on the order slip before it

leaves the office, in just what floor and section the material will be located.

Heavy Material —

Heavy material as has been said is stored on the lower floors to save the necessity for lengthy transportation; heavy hardware, wire and the like being located in the basement where it can be delivered direct from the wagons by way of a chute. Here it is assorted and piled in convenient locations for easy



The opened packages are stored in shelves directly opposite the piles of cases from which they were taken. The shelves are made of boxes and can be easily taken down, added to or rearranged.

handling. Conduit and material of a like nature is stood on end and separated by projecting joists against which it may rest.

Handling the Stock —

Incoming material destined for the upper floors is delivered at the ground floor and stacked in a space given up for that purpose in the neighborhood of the elevator. From here it is transported by freight elevator to its proper floor where it is again stored in the location set aside for this purpose until it can be assorted and permanently placed. Outgoing matter for the filling of orders is handled largely by a smaller elevator near the center of the building.



The floor is divided into sections by white lines painted on the floor, and all one type of material is stored in one area. This greatly facilitates the taking of inventories, and makes it easy to locate any kind of goods by means of a floor plan.

Both of these elevators are automatically operated with double control which permits of their being operated without an attendant. Safety features are installed so that opening the door automatically stops the car. In operation the elevator is brought to the desired floor by pressing the button, the door being closed. The door is then opened, the elevator loaded, and the door re-closed. It may now be sent to any desired floor by pressing the proper button. At the same time, the attendant on that floor is notified by ringing a bell that the elevator is enroute. A light which flashes on notifies him a moment later of its arrival.

There is no "junk" material allowed on any of the floors. One small section is devoted to this purpose and here obsolete apparatus or damaged articles are stored until they can be repaired or something done with them.

ELECTRICITY IN LUMBER WORK



An electrically operated lumber mill at Crane Valley getting out lumber for the new construction program of the San Joaquin Light and Power Corporation now in the process of formation. The transformer bank may be discerned in the shade to the left of the big tree just behind the building. Lumber of all sizes is being made here for use throughout the territory.



An example of practical conservation and cooperation. Sawing up the slabs as they come from the sawmill into sizes for use as stove wood. Huge piles may be seen on the dump in the background. The company employes, campers and residents in the locality and the Indians are permitted to make use of this waste wood in their homes.

FORESTRY WITH THE A. E. F.

(The following interesting account of some of the activities of the Forestry Section with the American army in France is extracted from the official report of the Director of Construction and Forestry, and is obtained through Lieut.-Colonel W. B. Greeley who served as chief of the Forestry Section, directly under the Director.—The Editor.)

The lack of ocean transport made it necessary to obtain practically all the lumber and other forest products required by the American Expeditionary Forces from French and other European sources. Shipments of such bulky material from the United States was restricted to a small quantity of piling and dock timbers used chiefly in the Bassens dock. Furthermore, the shortage of forest products in France and the heavy requirements of the French and British Armies made it necessary for the A. E. F. to be self-sustaining in the supply of these essential materials, which were called for in enormous and steadily increasing quantities. The current monthly requirements of the Army at the time of the Armistice totaled 50,000,000 board feet of lumber and timbers, 250,000 railroad ties, 6,500 pieces of piling and cribbing, 1,500,000 poles and entanglement stakes, and something over 100,000 cords of fuel wood.

Lumber production was begun in December, 1917, by the 10th Engineers (Forestry) which operated two American and four French mills during that month and cut 321,000 feet of lumber, 205 piles, 12,000 ties, 20,000 poles, and 1,200 cords of fuel wood. During the winter and spring of 1918, the forestry troops were augmented. Thirty-four mills were operated in March, 1918, and 59 mills in June. At the time of the Armistice, 90 operations, including 81 sawmills, were in progress, employing nearly 12,000 technical engineer troops and 8,500 service troops.

The earliest operations of the Forestry Section were undertaken in the Landes pineries of Base Section No. 2, where there was an early demand for piling, warehouse lumber, and railroad ties; in the Loire River Valley near the lines of communication and the large depots and construction projects in Central France, and in the softwood forests of the Vosges and Jura Mountains and the hardwood areas immediately behind the American sector of the front.

The forestry operations at the time of the Armistice were grouped in fourteen operating districts, each under a Battalion Commander and organized as far as practicable to function as a self-contained unit. In addition, eight operating units with portable sawmills were attached to the First and Second Armies, working near Engineer dumps and supplying them with the forest products most urgently needed from time to time.

Up until March 1, the Forestry Section produced approximately 206 million feet of lumber, 3 million standard gauge ties, 1 million small ties, 39,000 piles, and 1,800,000 poles and entanglement stakes, for the A. E. F. In addition to these amounts, approximately 10,000,000 feet of lumber and 440,000 standard ties were cut by two forestry battalions

which were loaned to the French and British Armies. All told, the Forestry Section up to the same date supplied 400,000 cords of fuel wood to the army.

To maintain this enormous production, it was necessary to scout practically all of France south of the Northern Provinces for suitable timber and to negotiate its purchase through French channels.

On account of the delay in the arrival of American equipment, eight stationary French sawmills were leased or requisitioned in the fall and winter of 1917 and twelve portable French mills were acquired. This equipment aided greatly in meeting the acute shortage of lumber. The French plants were largely remodeled by the forestry troops and their production doubled or trebled. Their capacity was still so limited, however, that they were discarded as rapidly as American mills could be obtained.

Three types of American sawmills were employed:

(1) A heavy-powered, permanent steam plant, rated to cut 20,000 board feet in 10 hours.

(2) A moderately powered, portable type of steam sawmill, rated to cut 10,000 board feet in 10 hours.

(3) A very light, portable "bolter mill," run either by steam or by gas tractor, rated to cut 5,000 board feet in 10 hours and especially suited to light products like railroad ties.

Twenty of the large mills were installed at points where the supply of timber permitted their operation for eight months or longer. The other mills were well adapted to the many small wood-lots in France which it was necessary to utilize. In the face of a critical shortage of lumber, every possible effort was made to speed up production. Practically all sawmills were operated day and night shifts and some of them three 8-hour shifts. More than double the rated capacity of the plants was obtained currently by most of the forestry operations. Upwards of 150,000 feet of lumber were cut in twenty hours at several of the large mills whose rated capacity for the same period was 40,000 feet. Cuts as high as 66,000 feet of railroad ties were made in 20 hours on the little bolter mills. All of the large and many of the small mills were steamed successfully by means of dutch ovens for burning sawdust, designated and installed on the ground by the forestry millwrights. An enormous quantity of fuel wood was saved by this means.

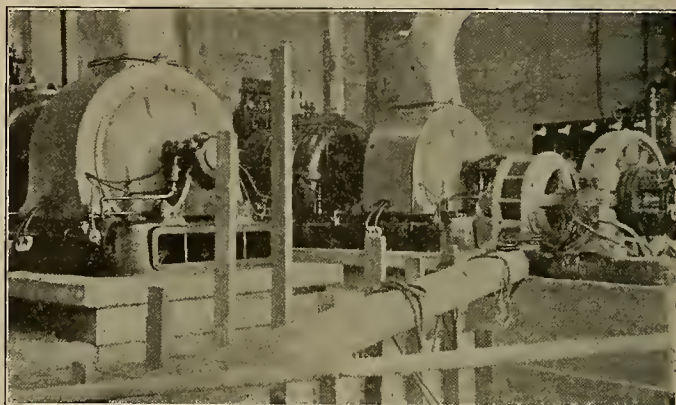
Standard or meter gauge railroad installations, up to three miles in length, were necessary at two-thirds of the mills to give them direct rail connections and provide adequate facilities for loading cars. Light railroads of 3-foot, meter, or 60-centimeter gauge, with steam or gas locomotives or horse-drawn trams, were used for logging at many operations. A difficult area in the Vosges Mountains was logged by means of a 4,000 foot meter gauge incline, with an average grade of 35 per cent, down which carloads of logs were lowered by donkey engine and cable. Much of the logging was done by horses with log wagons, spool carts, or high wheels. The excellent French roads were used extensively for bringing in logs by motor trucks and by tractors drawing slow-speed trailers or log-wagons. 100-foot piles were hauled by this means for distances up to 15 kilometers.

One of the noteworthy accomplishments of the Forestry Section was the cutting and logging of 15,000 piles from 65 to 100 feet in length, under great difficulties, which assured the completion of the major dock projects at the A. E. F. base ports. Approximately 15,000,000 feet of long, heavy timbers, requiring special selection and manufacture, were also furnished for dock, barge and bridge construction. By an active field organization, it was possible to keep the current rail and cargo deliveries of lumber, ties and piling up to 75 per cent in spite of the shortage of transportation facilities in France.

ELECTRICITY IN A MILLING PLANT

(Development in industrial plants is now almost universally characterized by a change to electric drive, or by important electrical installations such as the new generating plant described below.—The Editor.)

A new generating plant has recently been completed at Atchison, Kansas, for the Blair Milling



The main generators are 750-kw. each and have a speed of 1800 r.p.m., generating at 2300 volts. The exciters are shown at the right.

Company. The power supply is to be used for operating the motors throughout the mill, which has complete electrical equipment.

Enclosed Generators —

The generators are entirely enclosed, with ventilating pipes leading to the exterior of the building.



Switchboard and meters in the generating plant of the Blair Milling Company at Atchison

The cooling air is admitted from the basement through proper openings in the floor.

Exciters —

In the foreground of the illustration showing the turbines are located the pump pits, while at the

right are the exciters. The smaller unit is a 50-kw. General Electric machine, used for exciting purposes only. The machine at the right is a Western Electric 50-kw., d.c. generator, so connected that it can be used for lighting as well as for exciting the main generators.

Main Generators —

The main generators are 750-kw. each, and have a speed of 1800 r.p.m. generating at 2300 volts. They are driven by direct connected Curtis steam turbines. The a.c. motors in the mill total over 1000 h.p., con-

sisting of 1—250-hp., 1—200-hp., 1—150-hp., 2—75-hp. and numerous smaller units. The d.c. motors total about 130 hp., varying in size up to 40 hp. The average load will probably be about 800 kw.

The Boiler Room —

The boiler room of the plant is designed to reduce the labor as much as possible. There are 4 B. & W. boilers and two Atlas boilers, all equipped with Rosey stokers. Coal conveyors and bunkers are provided, and the ash handling is entirely automatic.

Cooperation as a Bankable Asset

BY C. W. BANTA

(Promotion, sales, advertising, financing—each part of a business is linked with every other and none can function successfully except in harmony with the rest. This spirit of concerted action, and the attitude of the banks towards the business which demonstrates it, is here discussed by the assistant cashier of the Wells Fargo Nevada National Bank in the last of a series of articles on cooperation.—The Editor.)

Recently, the factory superintendent of a large eastern corporation came to San Francisco to find a location and to prepare plans for a Pacific Coast branch factory. He bore a letter of introduction to the bank and came to see me.

In the course of conversation, I asked him what his Company intended to do.

He gave me an interesting description of the kind of property he must find, of the appearance of the factory when completed. He spoke at length of the machinery that should be installed, of the product and the method of manufacture that would be used in its output.

When he left, I had a clear picture of that Company. It needed nothing to complete my appreciation.

The Individual Viewpoints —

About three weeks later, their sales manager visited the Company's jobbers upon the Pacific Coast. He also came in to see me.

We talked of mutual friends in the trade and of the position of the Company's line—of its growing importance—of its market here and last, but not least, we talked of his competitors' sales practices. And, again, I had a perfect picture of what might have been a complete business in itself.

Within two months, the Treasurer visited us. He spoke of the Company's finances, of its banking accounts, of the funds that it would need, of the costs in the transfer by telegraph and by mail of funds from the various Pacific Coast cities to eastern centers. He discussed our ability to cooperate in credit investigations and mentioned various other matters that came within the scope of his activities. Again, a complete picture.

After these men had returned to the East and made their various reports, the President of that great corporation came out here.

Working Together —

It was not until after his conversation that I realized the absolute independence of each of these various factors in the business—and yet, with all,

of their utter dependence, one upon the other for cooperation.

The President spoke of the source of the raw materials for their factory, of the labor that would have to be found and employed to operate the factory, of the factory itself, of the overhead expense of running the factory, the amount of sales in the territory, the overhead expense of the sales force, of the general office force necessary in the conduct of his business here. He discussed transportation problems, collection problems, and he went the sales manager one better and inquired regarding conditions in foreign ports bordering upon the Pacific Ocean and I had the opportunity of suggesting that part of the export department be transferred from New York to San Francisco.

In bringing out the various factors which make for success in business I have tried to present—

The absolute independence of each unit in its full action. Yet, the utter dependence of each unit upon the others in achieving success for any unit.

That this dependence is cooperation—that it is not made by material things—but of Mental, Moral, Ethical, Spiritual ideals.

That ability of each to visualize the future, to enact a plan or policy which will bring the entire group in that business, without stragglers, to the point of realization of present hopes of future success and of business happiness.

An Example of Cooperation —

I want to tell you of the greatest single example of cooperation that I have ever seen.

Recently, during a storm at sea, a great flock of geese were winging their way southward into the teeth of the gale. They flew close to the water—swiftly—heads flat—necks straight—every bird of them straining against the wind.

They flew in the formation of a great capital "V" with the sharp point toward the south.

I glanced at the birds down the left side of the "V." The second bird was sheltered slightly—the wind pressure against his right wing being broken by the passage of the leader through the air.

The third bird in line, undoubtedly, had less wind resistance, for the other birds were shielding him.

As I looked down the long stretch of birds, I said to myself, "What wonderful cooperation!"

Then I glanced back to look for stragglers, but there were none. I noticed that the ends of the "V" were bent slightly in—like the prongs of a wishbone.

The third-bird from the end drew my attention. He had missed a flap of his wings—he was sailing—often he would rest on the wind. He was tired! Others around were more worn out than he—but strange to say, they made as good speed as the leader—But—how?

I do not know their habits, but I like to think that each bore the brunt as leader—that the posi-

tion of each in the line attested to the strength of the individual at that time, and that those that were resting in the air pockets and eddies behind the sharp point of the "V" had already given of their best strength to the flock and were still eager to take their place again on the front of the line.

At all events, I feel sure the strongest faced the wind and that the weaker were under the protection of the strong and that all arrived together at their happy destination quicker and more safely than could any one of them, had he battled the elements alone.



California Electrical Co-operative Campaign

An Educational Campaign in Which the Various Electrical Interests
Co-operate to Improve the Industry's Service to the People

(Among the recent activities of the California Electrical Cooperative Campaign the idea of the "electrical page" in the newspapers is making great headway. The extensive list of stores which have made important improvements gives some idea of the tangible results which the Campaign is accomplishing in the merchandising field.—The Editor.)

REPORT OF ADVISORY COMMITTEE FOR MONTH OF SEPTEMBER

An Electrical Page —

At the present time the Advisory Committee is making a determined effort to build up in every newspaper of importance in California an electrical page for the purpose of getting the "do-it-electrically" idea before the public through advertisements and reading matter. The Secretary recently devoted three weeks to starting this campaign in the southern part of the state. He presented the subject to the central stations, manufacturers, jobbers and contractor-dealers; in all five hundred persons, representing the territory south of the Tehachapi. All expressed themselves as desirous of seeing an electrical page established and of doing their part to bring it about. He also called on twenty of the larger newspapers whose advertising managers promised to do all they could to secure electrical pages through solicitation.

The Los Angeles Gas and Electric Company will start an advertising campaign in three of the Los Angeles newspapers and will run one advertisement a week on electrical appliances, of approximately four by ten inches, around which the dealers can group their advertisements. The Southern California Edison Company has made a special appropriation of \$2,000.00 for November and December to use in building up these pages in their territory outside of the city of Los Angeles. The Southern Sierras Power Company has agreed to use all of its advertising space for the purpose of starting electrical pages in its territory. This is viewed by the Advisory Committee as increased subscriptions from these corporations for the purpose of promulgating the cause represented by the California Electrical Cooperative Campaign and is gratifying.

The jobbers responded in excellent fashion. They promised to see that the copy of the contractor-dealers was of the highest quality and some inti-

mated that they would aid financially the contractor-dealer in his advertising efforts. The contractor-dealers themselves readily accepted the idea of an electrical page and promised to run advertisements of their own to tie-in to the central station advertisements.

In San Francisco the Bulletin is endeavoring to develop an electrical page. The Pacific Gas & Electric Company has agreed to run in that newspaper one advertisement a week around which the dealers can build their advertisements. Electrical pages are now appearing in Bakersfield and Fresno.

Major Improvements —

A careful checking by the field representatives results in the following report on major improvements among the contractor-dealers since the California Electrical Cooperative Campaign began, or in a year and a half.

New stores, 50; stores that moved into a better location, 65; stores that have made major improvements, 43; total, 158. Number of solicitors employed at present, 123.

The new stores represent contractors who have developed into contractor-dealers and former solicitors of central stations and salesmen of jobbers and manufacturers who have opened electrical stores of their own. The expansion has been within the industry. By major improvements is meant alterations that have resulted in a complete change and remodeling of the store for the better. No notation is made of the number of stores that have made minor improvements such as window displays, installation of lamp racks, new show cases and the like, because every store in California shows some improvement. Of 123 solicitors employed, twenty-five spend one-half of their time in the store and one-half in outside soliciting. This improvement we believe worthy of the attention of our contributors.

Following are lists of the stores and improvements referred to:

MOVED INTO NEW LOCATION —

Territory of Curt C. Davis.—Electric Motor & Machine Co., M. C. Baker & Son, Inc., Byington Electric Co., Electrical Products Sales Co., Hampton Electric & Machine Co., Liberty Electric Co., and A. F. Wells, all of San Francisco; Andrews Electric Co., and Spotts Bros., Oakland; Bogles Electrical Works, San Rafael; San Jose Electric Co., San Jose; J. A. Foster, San Mateo; Strom Electrical Co., Alameda; Concord Hardware & Plumbing, Concord.

Territory of W. F. Brainerd.—Sacramento Appliance Co., and The Electric Shop, Sacramento; Gould the Light Man, Commercial Electric Co., and Electrical Engineering & Manufacturing Co., Stockton; Chas. Eyeman, Madera; Fresno Electric Co., Fresno; E. M. M. Service, Lindsay; Star Electric Co., Bakersfield; R. A. Rounsaville, Tulare; E. B. Anderson, Coalinga; E. P. Greenep, Hollister; Bauer & Baugh, Petaluma; G. A. Dohmaier, Oroville; Western Gas & Electric Appliance, and W. S. Cass, Chico; W. F. Blide, Santa Cruz; The Motor Shop, Fresno.

Territory of A. L. Spring.—Bluebird Electric Appliance Shop, Campbell Electrical Shop, F. A. Clarke Co., Gans Bros. (No. 1), Chas. A. Holland, Hosking Electric Co., King Electric Co., West End Electric Co. (No. 1 and No. 2), and A. A. Wilson, all of Los Angeles; Akin Plumbing & Electrical Shop, Brawley; Winder & Jones, Covina; Strawn Electric Co., El Centro; Fillmore Electrical Shop, Fillmore; Ankrum Electrical Shop, Hemet; R. D. Aylesworth, Inglewood; Chas. Bean, La Verne; Lewis Electric Co., Long Beach; Marsh Electric Co., Long Beach; J. G. Robertson Electric Co., Orange; J. L. Mitchell, Oxnard; A. P. Gaylord, W. A. McNally & Co., and L. E. Taylor, Pasadena; Independent Electric Co., Redlands; Riverside Electric Co., Riverside; Burton Electric Co., and Whenn Electric Co., San Diego; Fred A. Downer & Co., and Nielson-Smith Electric Co., Santa Barbara; H. N. Snyder, Santa Paula; Torrance Electric Shop, Torrance.

MAJOR IMPROVEMENTS—REMODELED STORE —

Territory of C. C. Davis.—Abben Electric Works, Emporium, Haller Cunningham, Ickelheimer Bros. Co., and Roberts Manufacturing Co., San Francisco; Bird-Rymer, Oakland; Pacific Electric & Manufacturing Co., Richmond; Century Electric Co., and Garden City Electric Co., San Jose; Levy Bros., San Mateo; University Electric Co., Palo Alto; San Jose Electric Co., San Jose; Kohlway-Smith-Alfs Electric Co., San Francisco; Electrical Shop, Martinez.

Territory of W. F. Brainerd.—Lewis Electric Co., Central State Electric Co., and Valley Electric Co., Fresno; J. M. Nightingale, Modesto; C. E. Osborn, Turlock; The Electric Shop, San Luis Obispo; Harrington Lentz, Modesto; University Electric Co., Palo Alto; Solano Electrical Supply Co., Suisun; Kern Valley Electric Co., Bakersfield.

Territory of A. L. Spring.—Bluebird Electric Appliance Shop, Gans Brothers (No. 2), Gas & Electric Appliance Co., Llewellyn's Electrical Shop, and Woodill-Hulse Electric Co., Los Angeles; Reid-Farley Electric Co., Fullerton; J. A. Newton, Glendale; Moran & McWhinnie, Hermosa Beach; J. W. Lane, and Lantz Electric Co., Long Beach; Granger-Hall Elec-

tric Co., Ontario; H. L. Miller, Pasadena; Field Electrical Co., San Bernardino; Hartwell Electric Co., San Diego; Green's Electrical Store, San Pedro; Cope Electric Co., and J. G. Robertson Electric Co., Santa Ana; Fred A. Downer & Co., Santa Barbara; Smith Plumbing & Electric Co., Van Nuys.

USING SOLICITORS —

Territory of Curt C. Davis.—Byington Electric Co., San Francisco, 1; Holtermann's Electrical Shop, San Francisco, 1; Home Electrical, San Francisco, 1; Levy Electric Co., San Francisco, 2; Bird-Rymer, Oakland, 1; L. H. Bullock, Oakland, 2; Domestic Electrical Appliance Co., Oakland, 1; Kimball Electric Co., Oakland, 7; Piedmont Electric Co., Piedmont, 1; H. C. & B. C. Walker, Oakland, 1; Pioneer Electric Co., Richmond, 1; Wagner Bros., San Jose, 1; Garden City Electric Co., San Jose, 1; J. A. Foster, San Mateo, 1; Spott Bros., Oakland, 1; Hartley Hardware Co., Mountain View, 1; Century Electric Co., San Jose, 1; San Jose Electric Co., San Jose, 1; Watts Electric Co., San Francisco, 1; Advance Electric Co., Oakland, 1.

Territory of W. F. Brainerd.—Oscar Abbott, Hanford, 1; Harry Crow, Tulare, 1; R. A. Rounsaville, Tulare, 1; Robt. Tschennay, Visalia, 1; Chaffee Electrical Shop, Visalia, 1; E. M. M. Service, Lindsay, 1; Central California Electric Co., Lindsay, 1; A. R. Parsons, Porterville, 1; Umler Machinery Co., Porterville, 1; J. M. Nightingale, Modesto, 1; Cox Bros., Santa Cruz, and Salinas Electrical Works, Salinas, 1 co-op.; J. C. Hobrecht, Sacramento, 3; Sacramento Appliance Co., Sacramento, 6; Wallace & Smith (Sacramento), 1, (Stockton) 1; Western Gas & Electric Appliance Co., Chico, 1; Earl Wilson, Napa, 1; Valley Electrical Supply Co., Fresno, 7; Henry Berg, Marysville, 1; Noggle Electric Works, Monterey, Central Electric Works, Watsonville, E. P. Greenep, Hollister, and Hollenbeck Electrical Works, Gilroy, 1 cooperatively.

Territory of A. L. Spring.—W. C. Bailess, Los Angeles, 1; Beacon Light Co., Los Angeles, 1; Bluebird Electric Appliance Shop, Los Angeles, 3; William J. Burk, Los Angeles, 1; F. A. Clarke, Los Angeles, 7; Electric Lighting Supply Co., Los Angeles, 1; Gas & Electric Appliance Co., Los Angeles, 2; Foulkes Electrical Shop, Los Angeles, 1; Golden State Electric Co., Los Angeles, 1; F. E. Newberry Electric Co., Los Angeles, 22; Southern California Electrical Co., Los Angeles, 3; Winder & Jones, Covina, 1; Reid-Farley, Fullerton, 1; J. A. Newton Electric Co., Glendale, 1; Lantz Electric Co., Long Beach, 1; Pomona Fixture & Wiring Co., Pomona, 1; H. L. Miller Co., Pasadena, 2; Sanders Electrical Shop, Pasadena, 1; L. C. Taylor, Pasadena, 1; Granger-Hall Electric Co., Ontario, 1; Snyder & Bell, San Bernardino, 1; Field Electrical Co., San Bernardino, 1; Burton Electric Co., San Diego, 1; Hartwell Electric Co., San Diego, 1; R. L. Jennings, San Diego, 1; Southern Electrical Co., San Diego, 2; San Pedro Electric Co., San Pedro, 1; Coast Electric & Machinery Co., Venice, 1; Smith Plumbing & Electric Co., Van Nuys, 1; Geo. S. Funk & Son, Redondo, Moran & McWhinnie, Hermosa, Gardena Electrical Shop, Gardena, Torrance Electrical Shop, Torrance, and R. D. Aylsworth, Inglewood, 1.



Among the enterprising retail companies who have expanded their stores and are backing up the work of the California Electrical Cooperative Campaign is the Valley Electrical Supply Company of Fresno, California. The picture above shows the extensive show window, and that below, a special holiday display of appliances. This company is employing seven solicitors.

NEW STORES—

Territory of C. C. Davis.—General Repair & Electric Co., San Francisco; Fisher Electric Co., San Francisco; Campanile Electric Co., Berkeley; South Berkeley Electrical Shop, Berkeley; L. H. Bullock, Oakland; Domestic Electric Appliance Co., Oakland; D. C. Stanford, Oakland; Chas. J. Sengstacker, Pleasanton; Electric Service Co., Antioch; Rex Electric Co., San Anselmo; Watts Electric Co., Burlingame; F. X. Bodin, Sunnyvale; Melrose Electric Co., Oakland; Duane-Armstrong, Martinez.

Territory of W. F. Brainerd.—J. W. Northedge, Chico; E. R. Murphy, Los Banos; A. C. Sipe, Oakdale; E. B. McKinley, Paso Robles; The Appliance Shop, Stockton; Bright Spot Electric Co., Stockton; Sullivan Electric Co., Modesto; Turner Hardware Co. (electric dept.), Modesto; Sterling Electric Co., Sacramento.

Territory of A. L. Spring.—Advance Electric Shop, Los Angeles; Broadway Electric Shop, Los Angeles; Bullock's Electric Shop, Los Angeles; Callaway Electric Shop, Los Angeles; R. H. Evans, Los Angeles; Fix-it Electric Shop, Los Angeles; Gas & Electric Appliance Co., Los Angeles; The Lamp Shop, Los Angeles; Southwest Electric Co., Los Angeles; F. E. Spencer, Los Angeles; Holland Electric Shop, Anaheim; Winder & Jones, Azusa; William Coryell, Burbank; Graham Electric Co., Calexico; R. A. Lee, Colton; The Electric Shop, Huntington Park; Acme Electric Co., Long Beach; Sanders Electric Shop, Pasadena; Werner & Tomlinson, San Jacinto; Beemer's Electric Shop, Santa Ana; Groninger Electric Service Co., Santa Ana; Prest Electric Co., San Bernardino; Electric Installation Co., Santa Barbara; Gould's Electric Co., Santa Monica; Santa Monica Electric Co., Santa Monica; T. H. Armstrong, Santa Paula; Hall & Bashore, Covina.

ELECTRICAL ADVERTISING

The cooperative advertising of the Los Angeles Gas & Electric Corporation and the Electrical Contractor Dealers started with two pages in the Los Angeles Examiner Wednesday morning, November 5th, and a page and a half in the Express, Wednesday evening, November 5th.

Below is given the schedule of the cooperative advertisements to appear in the Los Angeles papers:

Wednesdays

Examiner—Nov. 5th, 19th; Dec. 3rd, 17th, 31st.

Express—Same dates.

Mondays

Times—Nov. 10th, 24th; Dec. 8th, 22d.

Wednesdays

Herald—Nov. 12th, 26th; Dec. 10th, 24th.

Fridays

Record—Nov. 14th, 28th; Dec. 12th, 26th.

A DOUBLE STORE

The Electric Motor Maintenance Service, conducted by the Nutt Brothers, and briefly known as the E. M. M. Service, combines under one roof an automobile service station and an exceptionally attractive electrical store. Moving from their old quarters Harry and Seymour Nutt took over the entire space of a compact one-story building in a good location in Willard, and have now been fully settled for some months.

The front of the store is distinctly pleasing, and the well-arranged display window is supplemented by a show case in the entrance.



A store which combines an automobile service station and a retail store for the sale of electrical appliances. The one company occupies the complete building, having moved in from another location, and has many enterprising plans for building up the merchandising side of the business.

A feature of the interior is the fixture room which is fitted up with a fireplace and wicker furniture, giving an attractive home effect. The smaller appliances are displayed mainly in glass cases such as jewelers use, and all crowded effects are avoided.

The Nutt Brothers plan to add several solicitors to their organization and work out special campaigns for the sale of appliances.



A feature of this attractive interior of the E. M. M. Service is the fixture room shown in the background of the picture. It has a fireplace and is furnished with wicker furniture, the whole atmosphere being extremely pleasing.

Reproduction of a page from the Bakersfield Californian, showing the large advertising spaces being used by electrical concerns, and the way in which power company and dealer are grouped as in a single advertisement, significant of the common interests of all branches of the industry. Note the electrical items in the news section also.

The Electric Range

BY PIERRE L. MILES

(Does the electric range satisfy the purchaser? Is the electric cooking load a profitable one for the central station to carry? What are the best merchandising methods to use? These and other questions connected with the electric range are taken up in the following paper, presented before a meeting of the Colorado Electric Light, Power and Railway Association.—The Editor.)

The electric range is the best cooking apparatus on the market. It will boil, fry, roast, bake, and broil, better than any other kind of range now used.

The initial cost of the range is not retarding the rapid introduction of electric cookery, as is sometimes claimed, and the cost of operating an electric range is purely a matter of educating your customers to the proper use of the range. All the cooking for a family of five may be done with 100 kw-hr. per month, and current in excess of this amount is unnecessary.

Neither is the electric range slow; if properly employed it compares favorably with other ranges wherever speed is necessary.

Though the heating of a large amount of water for bath purposes is not practical on an electric range, this will not be a deterrent to the sale of ranges, if the subject is properly handled, and the fact that the electric range will not heat the kitchen in the winter months is an advantage rather than a disadvantage.

Costs of Service—

Considering the subject from the point of view of the power company, also, there is more profit in the electric cookery load than in the lighting business: 600 watts of station generating capacity will serve a 6000 watt range. With a 3c cooking rate and with fuel costs of 1c per kw-hr., lighting companies can afford to spend at least \$100 in order to connect a range to their lines.

A 3c electric cooking rate can be justified against a 5c small motor rate on the basis of being a more profitable load. The electric range load should not bear the same expense of distributing current, as does the present lighting load. A 15-kva. transformer will serve a group of 20 ranges, having a connected load of 120 kw.

The investment required to serve a range customer is not as great as originally required to serve a lighting customer. There is more profit in selling 1500 kw. per year at a profit of $\frac{1}{2}$ cent per kw., (your range load) than in a profit, eight times as great per kw., for the lighting load. 200 electric ranges can be installed in nearly every small town, without having to increase the present generating capacity. Only 10 to 15% of the total connected range load will fall on the present station peak.

The diversity factor and load factor of the electric range load is far better than that of the lighting load.

Merchandising Methods—

It is not necessary for a lighting company to make any investment for the selling or advertising of electric ranges. With proper methods between 3 and 5 per cent of residential customers may be

sold an electric range during the first year of electric range sales work.

Advertising alone will not sell electric ranges; a low rate for electric current will not, in itself sell electric ranges; a display and description of what the electric range is will not sell ranges.

The campaign on electric ranges should consist of two parts, educational and sales.

The cost of the inside wiring should be included in the selling price of the range. Time payments are an essential part of a successful electric range business. The manufacturers system of discounts provides to compensate the central station man for the cost of retailing.

Increasing Opportunities—

The time is coming, and it is not so very far distant, when the central station man, responsible for sales, will be called upon to show a yearly increase in kw-hrs. delivered. The electric range load offers the golden opportunity to meet this demand.

Now is the time when far-sighted men are breaking the ground for this future business. They are placing their quota for the coming year.

They have carefully considered the following two basic factors in this field of central station activity: first, is the electric range a satisfactory article to recommend to the public? Will the purchaser be compensated and fully satisfied with his investment? Second, is a rate for cooking profitable to the central station? A comprehensive study of the question will reveal that it is.

Once these two points have been settled the sales manager must not allow any of the annoying details, incidental to any new business, swerve him from the purpose of building up this phase of his business.

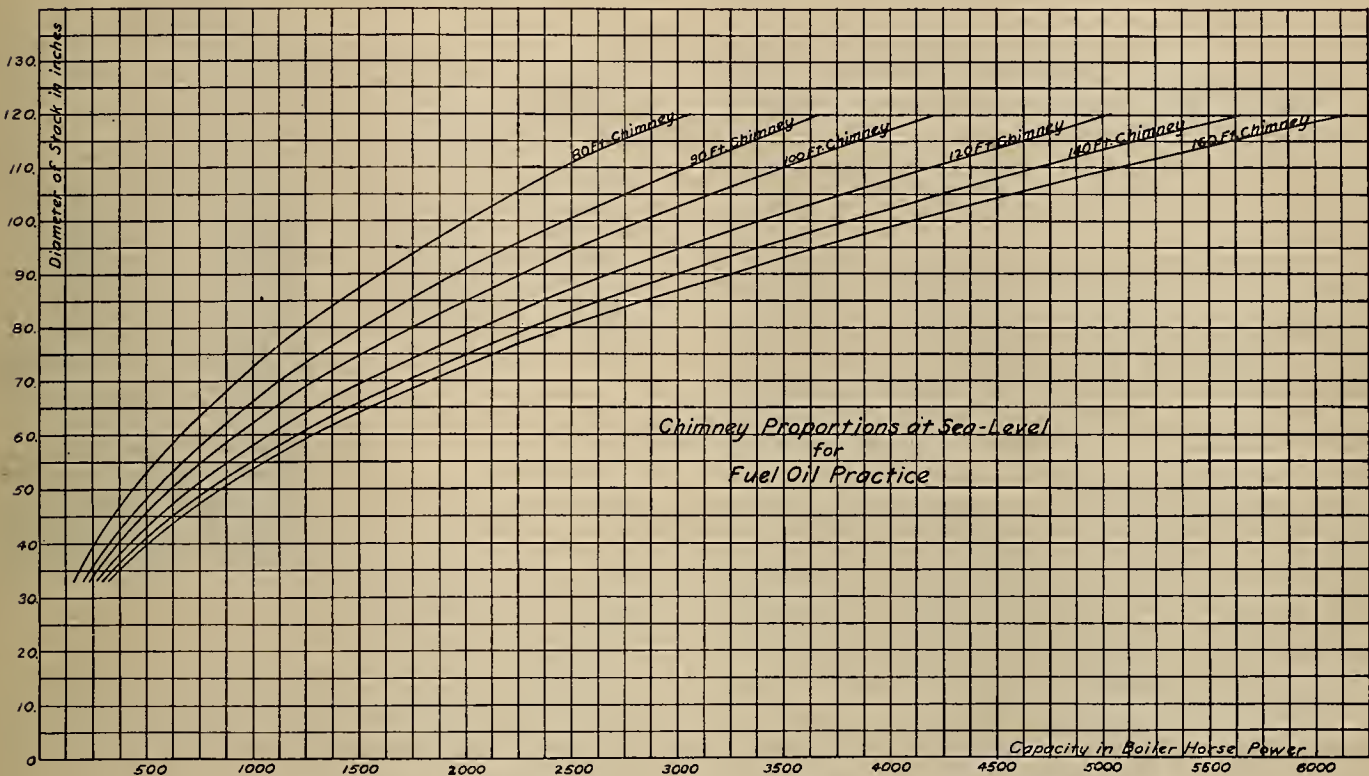
Water heating, initial cost, installation expense, time payments, heating of the kitchen, costs of selling, maintenance, are some few of the problems which are bothering central station men today. They are merely the details of the two basic facts. With earnest application they can and will be solved. But not by sitting back and hopelessly repeating "Electric ranges cannot be sold," because of this or that reason.

The building of the range load is hard—sometimes very hard. But it can be done. It takes both brains and live sales energy. It takes the pioneer, stick-to-it quality which made a success of the telephone, the automobile, the electric light, and every other new device brought on to the market.

First, be sure you are right in the first two points. Then go ahead, confident of success in the knowledge that if your fundamentals are correct, all other questions and conditions are capable of being solved and overcome.

FUEL OIL AND STEAM ENGINEERING

(A convenient chart is here given for determining the diameter of the chimney at sea-level, and also for corrections necessary to meet the changes in altitude. A comprehensive discussion of the applications of these principles to concrete practice, especially as adapted to the use of fuel oil is here presented by the authors of the book on "Fuel Oil and Steam Engineering" recently published.—The Editor.)



A DIAGRAM FOR ASCERTAINING CHIMNEY DIAMETERS IN FUEL OIL PRACTICE

In this diagram which has been drawn up from carefully collected data of C. R. Weymouth, the stack diameter for boiler installations of known capacity may be at once ascertained. The sizes of chimney as determined from this diagram are for nominal rated horsepower, as set forth with an allowance made for an overload capacity of fifty per cent. The proportions are computed for sea-level conditions.

SAVING THE WASTE IN THE CHIMNEY—VI.
CHIMNEY PROPORTIONS FOR FUEL OIL
PRACTICE

BY ROBERT SIBLEY AND CHAS. H. DELANY

After the great earthquake and subsequent conflagration in San Francisco in April, 1906, an unusual opportunity was offered for securing chimney data for fuel oil consumption, due to the fact that many stacks were partially demolished and it was therefore easy to secure data for varying heights of stacks.

An excellent paper by C. R. Weymouth setting forth the fruits of a careful investigation undertaken by him at this time may be found in the Transactions of the American Society of Mechanical Engineers, Vol. 34. The Babcock & Wilcox Company have adopted from the investigations of Mr. Weymouth a comprehensive table as shown below for picking the height and diameter of chimneys for crude oil consumption.

STACK SIZES FOR OIL FUEL						
Diameter inches	Height in Feet above Boiler Room Floor					
33	161	206	233	270	306	315
36	208	253	295	331	363	387
39	251	303	343	399	488	467
42	295	359	403	474	521	557
48	399	486	551	645	713	760
54	519	634	720	847	933	1000
60	657	800	913	1073	1193	1280
66	813	993	1133	1333	1480	1593
72	980	1206	1373	1620	1807	1940
84	1373	1587	1933	2293	2560	2767
96	1833	2260	2587	3087	3453	3749
108	2367	2920	3347	4000	4483	4867
120	3060	3660	4207	5040	5660	6160

An Example of Chimney Design for
Sea-Level Installation —

Let us from this data ascertain the diameter of a one hundred foot chimney capable of properly creating a draft for a one thousand horse power boiler installation so that the stack is of sufficient size to accommodate a 50 per cent overload. It is assumed that the stack is centrally located and that it has short flue connections with ordinary operating boiler efficiency. Since the data has been compiled to meet these conditions we find from the tables that a chimney 100 ft. high and 60 inches in diameter will develop sufficient draft for 913 boiler horse power

capacity and that a sixty-six inch diameter will develop 1133 boiler horse power. By interpolation we find that a 64 inch diameter will meet the conditions desired.

This data when plotted on a chart as shown in the illustration gives a convenient method of quickly and accurately ascertaining the diameter of a chimney for heights varying between eighty feet and one hundred sixty feet for installations at sea level.

As an illustration, let us find the proper dimensions of a chimney for a boiler installation of 1000 boiler horse power when oil is used as a fuel, assuming that the installation is at sea level. From the chart we readily find that for a chimney height of 100 ft., a diameter of 64 inches is sufficient. Other diameters for varying heights are similarly ascertained.

It will be noted from the table that it is possible to get several different combinations of heights and diameters of stacks for any particular boiler horse power considered. For instance, a stack for 1000 boiler horse power may be 64 inches diameter and 100 ft. high, or it may be 54 inches diameter and 160 ft. high. In the latter case the additional draft caused by the added height is lost on account of the extra friction caused by the smaller diameter, so that the net result is the same. The choice of the actual stack to be used must therefore depend on other considerations besides the draft. Usually this point is settled by estimating the cost of the different stacks that would fulfill the conditions, and then selecting the cheapest.

Sometimes stacks must be built higher than would otherwise be necessary, in order to discharge well above surrounding buildings, in which case a

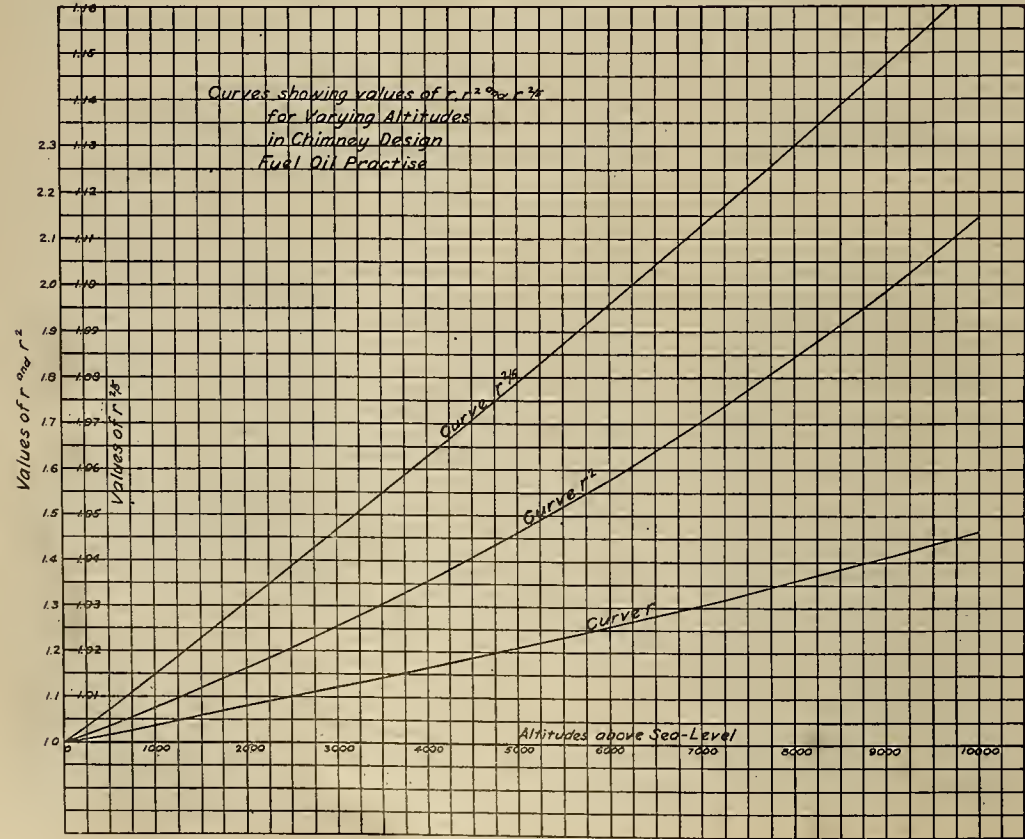
smaller diameter may be used than would be required for a lower stack. In tall office buildings the height of the stack is determined by the height of the building itself. It is not generally known that

The power plant in the Woolworth Building, New York, has the tallest chimney in the world. The height of the stack is determined by that of the building, but in some cases the stack must be built extra high in order to discharge well above surrounding buildings.



the tallest chimney in the world is the one provided for the power plant of the Woolworth Building in New York.

Chimneys that have small diameters in proportion to their height are somewhat objectionable on account of the variability of the draft. At the full load of 1000 boiler horse power, as we have seen, a



FACTORS FOR DETERMINING CHIMNEY PROPORTIONS AT ANY ALTITUDE

When chimney proportions are desired for altitudes other than sea-level, the ratio of barometric pressures at sea-level and the new altitude enters with the first power, the square and the two-fifths power. This diagram enables the designer to pick these factors for any altitude with ease.

54" x 160 ft. stack gives the same draft as a 64" x 100 ft. stack. At light loads, however, the 54" x 160 ft. stack will give a much greater draft, for it still has its full height, but the friction loss is much less. This increase of draft at light loads requires special care on the part of the boiler fireman to adjust his dampers for proper air regulation.

Corrections in Chimney Height for Altitude

We shall next consider the necessary corrections to be made in the dimensions of proposed chimneys in their relation to altitude above the sea. All chimney dimensions and tables have been computed on the basis of sea-level pressures. From our equation of draft readings previously derived, it is seen that the draft depends directly upon the atmospheric pressure. Hence it is evident that since the higher the altitude, the less the pressure, the stack must be lengthened in proportion to the barometric readings. Thus if H is the proper height of a chimney at sea level or barometric pressure P_0 , then H_1 the proper height at the altitude P_1 above sea level is as follows:

$$\frac{H_1}{H} = \frac{P_0}{P_1} \text{-----} (95)$$

or if r is a factor obtained by dividing the barometric reading at sea level by the barometric reading at the proposed point of installation,

$$H_1 = rH \text{-----} (96_a)$$

This reasoning is based on the assumption of constant draft measured in inches of water at the

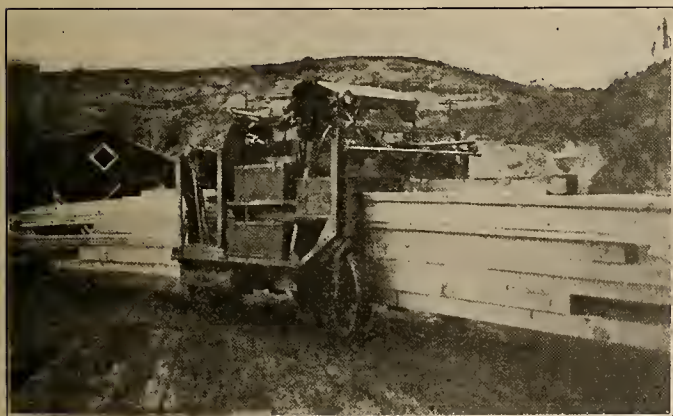
base of the stack for a given rate of operation of the boilers regardless of altitude.

Weymouth, however, advances a new theory in his paper above referred to, when the assumption is made that boilers, flues, and furnace remain the same, and further that the increased velocity of a given weight of air passing through the furnace at a higher altitude would have no effect on the combustion. Under such an assumption it is evident if a given boiler plant, with its stack operated with a fixed fuel, be transplanted from sea level to an altitude, assuming temperatures to remain constant, that the total draft head measured in height of column of external air will be numerically constant. The velocity of chimney gases will, therefore, remain the same at altitude as at sea level and the weight of gases flowing per second with a fixed velocity will be proportional to the normal barometric pressure. On this assumption it follows that the increased frictional losses can be compensated at altitudes by a suitable increase in the diameter and that the chimney height must be increased inversely proportional to the square of the ratio of barometric readings r or

$$H = r^2 H \text{-----} (96_b)$$

It is possible that the true correction lies somewhere between the values ascertained by the two theories above set forth. A computation on the latter basis of the inverse of the square is probably, however, nearer the truth than the former and it is certain that any error involved is well within the accuracy of other constants involved in the design.

Special Applications of Electricity in the Lumber Industry



Above is shown an electric truck employed by the Peninsula Shipbuilding Company, St. Johns, Oregon. This truck is built especially for heavy duty, handling lumber and timbers for the big wooden vessels. It makes good speed and is very efficient.

At the right below is shown a thirty-ton electric crane speeding up lumber production at Springfield, Ore. It is the property of the Booth Kalley Lumber Company, and handles large quantities of lumber in a highly satisfactory manner.



The New Physics

BY A. C. CREHORE

(The elimination of one of the unknowns from a basic equation lays the foundation for a clearer understanding of fundamental electrical theory. The author of this interesting series of articles has advanced important new theories in physics which are the subject of widespread discussion.—The Editor.)

So long as attention was confined to quantity of electrical charge and to quantity of magnetism alone, it never appeared that there was any need for a unit of quantity of electricity on the electromagnetic system of units, nor of quantity of magnetism on the electrostatic system of units, for these quantities differed so in kind apparently that there was no possible way of measuring one by the unit adopted for the other. It soon appeared, however, that the electric current is a kind of connecting link between these apparently different kinds of quantities, and that electric current could be measured in the units of either system.

This becomes evident when we reflect that two charged conducting spheres may be completely discharged by connecting them with a conducting wire provided their charges are equal and of the opposite sign. In other words the discharge of a condenser, for the two spheres constitute an electrical condenser, causes an electrical current to flow in the discharging wire, and some unit had to be found by which to measure this current. Also some law had to be discovered connecting the value of the current produced by the condenser with the value of the original charge of it. This law states that the electrical current is equal to the time rate of change of the original charge. It takes time to discharge a condenser, but usually the time is very brief according to our common notions of time, so short indeed that the measurement of the time at first presented some difficulties.

And again, Faraday showed that it was possible to produce a current of electricity without the use of a condenser at all, by the very simple process of moving a magnet in the immediate vicinity of an electrical conductor, and he worked out with consummate skill the exact laws that now bear his name, by which quantity of magnetism and the electric current produced by any definite relative motion between the conductor and the magnetic field become connected by definite expressions.

Different Units of Current

Now, an electrical current produced by the discharge of a condenser through a wire and again produced by the motion of a magnet in its vicinity, are apparently just the same kind of thing. Indeed the two currents are so much alike that, if the observer of the current itself did not know the source from whence it was derived, he would be unable to tell what the source of it is. It has precisely the same effect upon any of the instruments at his disposal for the purpose of detecting and measuring electrical currents. But, let us now suppose that the observer of the current knows of the source from whence it comes, and applies the known laws in each case to obtain the measure of precisely the same

magnitude of current, the first obtained from the condenser, and the second obtained from the motion of the magnet. He is surprised to find that the numbers obtained when using the electrostatic system of units and the condenser are very large indeed as compared with the numbers obtained when using the magnet, and the electromagnetic system of units. Indeed, a study has been carried out in this way to find the constant ratio between the numbers obtained for the same current on the electrostatic system and on the electromagnetic system of units. This ratio comes out the same every time and is equal to the number approximately 30,000,000,000, which is for brevity always written 3×10^{10} . The larger number is obtained when the electrostatic units are employed, and the smaller when the electromagnetic units are used. The meaning of this is that the electromagnetic unit of electric current is this large number of times greater than the electrostatic unit of current, and that this has resulted simply because of the arbitrary methods of choosing the units of quantity of electricity and of magnetism, not knowing at the time that they implied such different units of current.

Having thus established a unit of current on each system of units, each of the other units in turn receives expression in both systems, including the units of quantity of electricity and of magnetism with which we started. And in a similar manner the ratios of the magnitudes of each of the units for the same kind of quantity have been measured in each system. The unit of quantity of electricity on the electromagnetic system is found to be 3×10^{10} times the unit of quantity of electricity on the electrostatic system. The unit of electromotive force on the electrostatic system is 3×10^{10} times larger than the unit for electromotive force on the electromagnetic system. The unit of electrical capacity on the electromagnetic system is found to be 9×10^{20} times the unit of capacity on the electrostatic system.

Electromagnetic Theory of Light

The result thus obtained is very surprising because the ratios between the units always come out the same number, 3×10^{10} or some power of this number. Moreover, this number happens to represent very exactly the numerical value of the velocity with which light travels. This is very strange, and it resulted merely from the manner in which these units were originally defined. It is inevitable to avoid the conclusion that the phenomena of light are in some way very intimately connected with those of electricity and of magnetism. It was James Clerk Maxwell who first pointed out that there is a very definite connection between light, electricity and magnetism in his celebrated treatise on Electricity and Magnetism, in which he developed an electro-

magnetic theory of light. He predicted in this that, when electromagnetic waves were discovered at some future time, it would be found that they will travel at the same velocity as light waves do. This prediction has been fulfilled since that time, and the waves now in common use in so-called wireless telegraphy travel at the speed predicted by Maxwell.

One of the reasons for mentioning this subject here is that during the course of developing his electromagnetic theory of light, it was shown to be a necessary condition that the product of the specific inductive capacity and of the magnetic permeability of the medium shall be numerically equal to the reciprocal of the square of the velocity of light. The relation may be thus expressed,

$$k \mu = 1/c^2,$$

where c denotes the velocity of light. In other words, the so-called dimensions of the product of k and μ have been known ever since Maxwell's day, namely $L^{-2}T^2$, the reciprocal of the square of a velocity. But this did not give any knowledge of either one of the two quantities independently. It rendered it likely, however, that k and μ depend upon space and time alone rather than upon space, mass and time. This is in agreement with the statement made above that specific inductive capacity may be considered to be the reciprocal of a velocity, for this involves space and time only, and not mass. But, if this is the correct interpretation of specific inductive capacity, the relation found by Maxwell automatically determines the magnetic permeability and makes it also the reciprocal of a velocity, the same kind of a quantity as specific inductive capacity. It is a direct consequence of this that electrical charge and quantity of magnetism have the same dimensions and represent the same sort of kind of quantities.

Quantity	TABLE I.									
	Dimensions on Electrostatic System of Units				Dimensions on Electromagnetic System of Units				Dimensions Length Mass and Time	
	L	M	T	k	L	M	T	μ	L	T
Mass,	m	0	1	0	0	1	0	0	0	1
Momentum,	mv	1	1	-1	0	1	1	-1	0	1
Moment of momentum,	mva	2	1	-1	0	2	1	-1	0	2
Energy,	mv ²	2	1	-2	0	2	1	-2	0	2
Force,	F	1	1	-2	0	1	1	-2	0	2
Spec. Induc. Capacity,	k	0	0	0	1	-2	0	2	-1	-1
Magnetic Permeability,	μ	-2	0	0	1	0	0	0	1	-1
Electric Capacity,	C	1	0	0	1	-1	0	0	1	0
Coef. of Self Induction,	L	-1	0	2	-1	1	0	0	1	0
Electrical Resistance,	R	-1	0	1	-1	1	0	-1	1	0
Electromotive Force,	E	1/2	1/2	-1	-1/2	1/2	1/2	-2	1/2	-3/2
Magnetomotive Force,		3/2	1/2	-2	1/2	1/2	-1	-1/2	1	3/2
Electric Force,		-1/2	1/2	-1	-1/2	1/2	1/2	-2	1/2	-2
Magnetic Force,	H	1/2	1/2	-2	1/2	-1/2	-1/2	0	1/2	-3/2
Electric Displacement,	D	-1/2	1/2	-1	1/2	-3/2	1/2	0	-1/2	-1/2
Magnetic Flux Density or Induction,	B	-3/2	1/2	0	-1/2	-1/2	1/2	-1	1/2	-1/2
Quantity of Electricity,		3/2	1/2	-1	1/2	1/2	0	-1/2	1	1/2
Quantity of Magnetism,		1/2	1/2	0	-1/2	3/2	1/2	-1	1/2	-1/2
Total Magnetic Flux,		1/2	1/2	0	-1/2	3/2	1/2	-1	1/2	-1/2
Planck's Constant,	h	2	1	-1	0	2	1	-1	0	2
Rydberg's Constant,	K	0	0	-1	0	0	0	-1	0	0
Newtonian Constant,		3	-1	-2	0	3	-1	-2	0	2

In order to give a more comprehensive idea of what it means to have found the separate dimensions of specific inductive capacity and magnetic permeability Table I has been prepared. In the first column appear the common names of the kinds of quantities whose dimensions are given in the other columns. In the second column are given in some instances the symbols commonly used for the quantity, but there is no standardization of these symbols as yet, and these letters have no great significance. In the next group of four columns appear the common dimensions of the quantities on the electrostatic

system. For example, quantity of electricity has opposite to it the numbers 3/2 1/2 -1 1/2, as representing the exponents of the letters at the tops of these columns, which makes the dimensions of quantity of electricity, $L^{3/2} M^{1/2} T^{-1} k^{1/2}$, the same as the dimensions derived in the text above for the electrostatic system.

The next group of four columns gives the values of the exponents of L , M , T and μ , thus representing the dimensions of the same units or quantities on the so-called electromagnetic system of units. Since by Maxwell's equation, $k \mu = 1/c^2$, or $k = 1/\mu c^2$, we may convert any electrostatic dimensions into electromagnetic by merely substituting for the k in the electrostatic column its equivalent in terms of μ . And, because the k does not involve mass it is seen that the exponents of mass are exactly the same for each quantity in the two systems.

If for the k in the electrostatic column its equivalent dimensions, $L^{-1}T$, are substituted, the k is entirely eliminated, and the exponents given in the next group of three columns are obtained. Or, if for μ in the electromagnetic column its equivalent, $L^{-1}T$, is substituted, we obtain precisely the same exponents for L , M and T as by eliminating the k from the electrostatic column. This gives as a result a single system of units for all quantities in terms of length, mass and time only.

Nature of Electrical Resistance

It appears from this new table that quantity of electricity and quantity of magnetism are quantities of the same nature having the same dimensions as already pointed out. Also, specific inductive capacity and magnetic permeability have the same nature, as already stated. And again, electrical capacity and the coefficients of self and of mutual induction have the same dimensions. Electrical resistance becomes dimensionless in terms of length and time. It was already dimensionless in terms of mass in each of the former systems, and in the electromagnetic system it had the dimensions of a velocity times μ , which is now the reciprocal of a velocity. Hence electrical resistance is of the nature of the ratio of two different velocities, and has no dimensions at all, being simply a numeric like the quantity, β , which usually denotes the ratio between the velocity of an electron and the velocity of light.

Because of the relation expressed by Ohm's law, namely $R = E/I$ since resistance is dimensionless it follows that electromotive force has the same dimensions as electrical current and it so appears in the new table. Also magnetomotive force has the same dimensions as electromotive force, indicating that they are each quantities of the same nature. And again, electrical quantity divided by a time gives electrical current. We have seen that the rate of change of the quantity of electrical charge is equal to current. And again, electric force has the same dimensions as magnetic force, and electric displacement the same as magnetic flux density, that is magnetic induction.

In other words the results obtained by making k the reciprocal of a velocity are not irrational. The quantities that might be expected to be the same

come out the same, and there is nothing about it that looks like chance. They do not come out in any haphazard fashion, as they certainly would if the dimensions assigned to k were different from the reciprocal of a velocity.

Elimination of Mass

The last two columns of the table must be mentioned in advance of the narrative. In this new table appear only length and time, mass having been eliminated from the preceding columns. Reasons have appeared that make mass the reciprocal of specific inductive capacity, and taking specific inductive capacity as the reciprocal of a velocity, this gives mass the dimensions of a velocity, LT^{-1} . Hence, granting this, mass is not a fundamental unit like length and time, because it may be expressed in terms of them, and consequently it has been eliminated by putting for each M in the previous tables the dimensions LT^{-1} . This operation does not affect any of the statements just made concerning the similarity of the magnetic and the electrical units, for mass already appeared in each of these with the same exponent for each kind of unit in the two systems.

We have, therefore, arrived at a final table of dimensions of units in terms of length and time only, having eliminated three of the quantities that formerly were required, namely, specific inductive capacity, magnetic permeability, and mass. It is not to be expected that we can go further than this, and it is very natural to retain space and time as the preferable kinds of quantities in which to express the dimensions of all units whether mechanical, electrical or magnetic.

Technical Hints

BY LOUIS ETSHKIN

(The various elements which cause power losses in electrical machinery are here discussed by the electrical engineer of the Halcyon Radio Company. This is the third of a series of articles discussing the theories back of familiar problems and practices in practical electricity.—The Editor.)

FACTORS CAUSING POWER LOSSES IN ELECTRICAL MACHINERY

No mechanical or electrical piece of apparatus can be 100% efficient, although some in the electrical field are nearly that. Electrical machinery may be divided into two general classes, rotating and stationary. Of course rotating machinery has the losses due to bearing friction, brush friction and windage. With very high speed machines, the latter mounts up to considerable proportions.

The other losses are common to both stationary electrical apparatus like transformers, and rotating electrical apparatus such as motors and generators. These losses can be subdivided into the two classes of copper and iron losses.

Copper Losses —

The copper loss depends on the square of the current times the resistance, or is I^2R . This means that the loss increases very rapidly as we increase the current. For example, if we double the resistance we increase this loss two times; if we double the current, we increase it four times.

On the face of it, it would seem then, that if we had two ten-kw. generators of equal size, one delivering 90 amps. at 110 volts, and the other 45 amps. at 220 volts, that the former would have four times the I^2R loss of the latter. Let us see if this be so.

Assume that the conductor in the machine carries $22\frac{1}{2}$ amps. Then the 110-volt machine divides

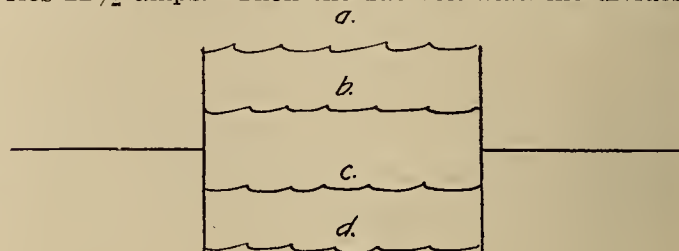


Fig. 1

Assuming that the conductor in the machine carries $22\frac{1}{2}$ amps., the 110-volt machine divides its conductors into four circuits in parallel, each circuit producing 110 volts.

its conductors into four circuits in parallel (Fig. 1), each circuit producing 110 volts. The 220-volt machine divides its conductors into two circuits (Fig. 2). Call the resistance of each circuit independently, one ohm. Then the resistance of Fig. 1 is $\frac{1}{4}$ ohm. The resistance of Fig. 2 is 1 ohm. The I^2R loss for Fig. 1 is $90^2 \times \frac{1}{4}$. The I^2R loss for Fig. 2 is $45^2 \times 1$. They are both the same. We can state this axiom: Two machines with the same amount of copper and the same number of amp. per sq. in. of copper, or **current density**, will have the same I^2R loss.

To cut down copper losses we must increase the amount of copper. Good design strikes a balance between excessive losses and excessive original first cost, and the current density runs between 1500 and 3000 amps. per sq. in. in practice.

Iron Losses —

Iron losses may be divided into two classes, eddy current loss, and hysteresis loss. The former is

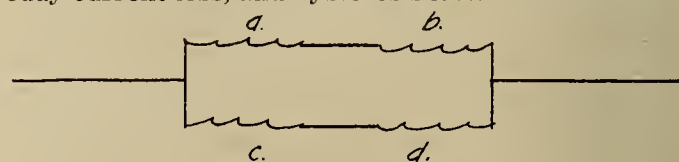


Fig. 2.

The 220-volt machine divides its conductors into two circuits. The I^2R loss is $45^2 \times 1$.

due to the short circuited current produced in the iron just as current is produced in the copper conductors. It may be cut down to very little by laminating the iron which is cut by lines of force of a magnetic field. This increases the resistance, thus cutting the current down tremendously, with the result that the power loss, I^2R , is cut down.

Hysteresis loss is due to the actual turning of the molecules of the iron as it is magnetized first in one direction and then in the opposite direction. It is really molecular friction and is cut down by choosing the right kind of iron or steel. The most favorable steel is soft steel with a rather high amount of silicon.

SPARKS—Current Facts, Figures and Fancy

(Recent new ideas include a wireless fog signalling device, electrical incubators, and an especially durable kind of paint. The "better lighting" campaign has been extended to policemen in Boston. Lemon drops seem to be the American soldier's staff of life, but in view of the disconcerting relationship between chewing gum and asphalt perhaps this is just as well.—The Editor.)

France is sending whippet tanks to the farmer to supply motive power to plow, cultivate, harvest and transport.

* * *

It is reported that certain large munitions works in Germany are perfecting an aeroplane which is practically noiseless in flight.

* * *

Speaking of statistics, this is one of the best for some time: the boys in France have been eating 200,000 pounds of lemon drops per month.

* * *

The Norwegian Fishery Administration is considering using electrically propelled boats in its fishing fleet. A considerable sum has been allotted for conducting research along these lines.

* * *

Application of electricity as a means of heating incubators and brooders is being proved so successful in economy and simplicity of operation that it will undoubtedly supplant all other methods of artificial incubation within a very short time.

* * *

It has been suggested that the humming of telegraph wires is due to changes of temperature which tighten or loosen the wire. No satisfactory explanation of the phenomenon has yet been advanced. The common belief that it is caused by the wind is erroneous, as the humming is heard during perfect calms.

* * *

The first business house in the world to employ an aeroplane of its own as part of its regular organization is said to be an English steamship and export company at Cardiff, Wales, which maintains a flying service for the transportation of important papers, samples, offers, and so forth, and to keep in personal touch with foreign buyers.

* * *

According to figures compiled by the United States Geological Survey from reports sent in by manufacturers of turbines and impulse wheels in the United States, the total horsepower of water wheels shipped during 1918 for the three states of Georgia, South Carolina and Tennessee, is almost equal to that shipped to all the other states.

* * *

Experiments are being carried on to establish a radio fog signaling system which will make the navigator independent of the lighthouse lamp. In connection with these experiments radio transmitting apparatus is being placed at three lighthouses

in Chesapeake Bay, and the radio receiving apparatus and direction finder installed on a lighthouse tender.

* * *

There are more than 300 by-products made from petroleum. These include paraffin wax, chewing gum, asphalt, tar, soap, turpentine, vaseline, coke, pitch, etc. A short time ago we were rather disturbed at coming across an announcement of a "soap and margarine factory;" but it appears we may yet expect to see a company advertising as "manufacturers of chewing gum and asphalt."

* * *

A paint manufacturer in England is showing samples of black paint or enamel which, on a five-year test in the tropics and a seven-year test in England, appears to be still unaffected by the action of atmosphere or water. This enamel is reported to withstand 700° F., 50 per cent sulphuric, and to be a non conductor and thus to resist electrolysis. It is said to have a covering capacity up to 13,000 square feet per hundredweight.

* * *

The actual cost of conducting the war, not including property destroyed, was between two hundred and two hundred and fifty billion dollars, according to estimates of the State Department. This was divided as follows: Great Britain, \$50,000,000,000; United States, \$25,000,000,000; France, \$25,000,000,000; Germany, \$35,000,000,000; Italy \$12,500,000,000. The remainder of the total was made up by the smaller countries engaged.

* * *

A new product suitable for use in electrical insulation is being obtained from the treatment of kelp in Australia. The moist precipitate is subjected to pressure and formed under pressure, after which it is hardened by treatment with formalin. The finished article is made by turning on the lathe, and a high polish is applied. The raw product is to be found in large quantities around the coast of Australia, and in particular on the Tasmanian shores.

* * *

Electrically illuminated policemen have been inaugurated in Boston. The traffic officer wears a head dress consisting of a light framework of copper wires, fitted over the hat, and bearing a small incandescent red bulb at the apex. This is lighted by electric current from a battery carried in the pocket. A white shoulder harness makes it possible to see the officer several blocks away. The Oregon police, on the other hand, are to wear civilian clothing at night. Is this a subtle compliment to Western criminals?

PERSONALS

M. E. Hixson has been appointed advertising field representative of the California Electrical Cooperative Campaign, and will devote his



energies to the building up of special electrical advertising pages and sections in California newspapers, especially in the northern part of the State. Mr. Hixson, as advertising manager of the Bakersfield Californian, was the pioneer in the development of the electrical page idea on the Pacific Coast. He brings to his new duties, which he assumes on December 1st, much valuable experience in the advertising and publicity field.

S. B. Gregory, of the Arrow Electric Company of San Francisco, is visiting in Portland.

R. F. Oaks of the National Carbon Company is among recent visitors to Portland and Seattle.

A. G. Griswold, of the A. G. Electric Company of Seattle, spent several days in Portland recently.

O. B. Stubbs of the Stubbs Electric Co., Portland, Oregon, is making an extensive tour of the East.

G. E. Armstrong, protection engineer for the Southern California Edison Company, is a recent San Francisco visitor.

T. E. Burger, Los Angeles manager for the Baker Joslyn Company, has recently returned from a trip East.

Fred F. Henshaw, of the U. S. Geological Survey, has just returned to Portland after an extended trip in the East.

H. C. Jones, secretary of the Oregon Association of Electrical Contractors and Dealers, is on a business trip to Vancouver, B. C.

Roy Turnball, of the Seattle office of the Edison Electric Lamp Company, was on a business trip to Portland and vicinity recently.

M. L. Joslyn, president of the Baker Joslyn Company, has returned to Chicago after visiting his Los Angeles, San Francisco and Seattle branches.

H. H. Thedinga, of Seattle, representing the Garland-Affolter Engineering Company, has been visiting Portland where he made several business calls.

W. C. Wurfel, district manager, Westinghouse Lamp Company, has returned to San Francisco after an extended business trip through Arizona and New Mexico.

Jesse M. Smith, past president of the American Society of Mechanical Engineers, and at present a consulting engineer of New York City, is a recent San Francisco visitor.

James H. Polhemus, general manager of the Coos Bay Shipbuilding Company of Marshfield, Ore., has been appointed port engineer and general manager of the port of Portland.

C. B. Merrick, for some time field manager for the Journal of Electricity, has accepted a position with the inspection department of the San Joaquin Light & Power Corporation.

Dick Chamberlain, formerly representative of the Hurley Machine Company, has been made Pacific Northwest manager of the company with offices in the L. C. Smith building, Seattle.

L. A. Knott, Pacific Coast representative of the Sangamo Electric Manufacturing Company, is a recent visitor to the home offices in the East, but is now again in his San Francisco headquarters.

C. B. Clingensmith, formerly of the Capital Electric Co. of Salt Lake City and the Montana Company of Butte, has accepted a position as general salesman with the Fobes Electric Company, Portland, Oregon.

Howard Angus, secretary of the California Electrical Cooperative Campaign, has been appointed vice-chairman of the membership committee of the Pacific Coast section of the National Electric Light Association.

Herbert J. Flagg has been appointed chief engineer of the state public service commission of Washington to succeed D. F. McCurrach, who has resigned to join the engineering staff of the North Coast Power Company at Portland.

Milton Rupert, general manager of the R. D. Nuttall Company, Pittsburgh, and Lester H. Keim, manager of the Tractor Gear Department of the same company, were visitors in San Francisco during the latter weeks of November.

Dr. Ira B. Cross of the University of California will address engineers of San Francisco on Tuesday, Dec. 2nd, under the auspices of the American Association of Engineers. His subject will be "What Kind of Engineers the World Needs."

J. C. Hobrecht of Sacramento is scheduled to address the San Francisco Electrical Development League at the luncheon meeting of December 1st at the Palace Hotel. His talk will deal with the problems of the retailer of electrical goods.

Newcomb Carlton, president of the Western Union Telegraph Company, accompanied by J. C. Williner, W. N. Fashbaugh and C. W. Yorke, vice-presidents of the same company, all from New York, are recent San Francisco visitors.

W. E. Symonds, of the Wilson Welder and Metals Company, New York, consulting engineer and member of the finance committee of the A. S. M. E., is among recent visitors to the West and has been spending some time in San Francisco.

L. E. Voyer, illuminating engineer of the Edison Lamp Works, has been in charge of the special exhibit of Edison and National Mazda lamps in the "Made-in-Oakland Week" at the T & D Theater, Oakland, during the last week of November.

Capt. W. B. Mel, recently discharged from the S. O. S., after service in France, and formerly with the Pacific Gas & Electric Company in San Francisco, has accepted a position as assistant superintendent with the Pauwella Pineapple Company at Maui, T. H.

Julean Arnold, United States Commercial Attache at Peking, China, lately arrived in San Francisco on leave.

Mr. Arnold is well known to men of the industry, having addressed the San Francisco Electrical Development League and other electrical organizations during his last sojourn in California. Much favorable interest has been aroused by able articles on electric power developments in China which Mr. Arnold has contributed to the Journal of Electricity. On his present trip Mr. Arnold will visit Washington, D. C., and



make a tour of the United States before returning to the Orient.

R. J. Davis, district sales manager of the Century Electric Company with headquarters in San Francisco, has moved into the offices formerly occupied by the Journal of Electricity in the Electric Bldg., 171-173 Second street. Mr. Davis will be long and favorably remembered as the staunch pioneer who financed and fathered the Journal of Electricity for so many years, beginning in this activity way back in 1895. In September last he retired from a substantial part ownership and from the directorate of the Journal of

San Francisco, that the company automobile which they had left parked on the corner in Oakland had been stolen. Mr. Woodward's private machine, which was parked alongside the company's, was not taken although the latter bore the company's name.

H. A. Barre, electrical engineer for the Southern California Edison Company with headquarters in Los Angeles, has returned from an extended trip to the East, where he has been attending a number of technical sessions of engineering committees of the National Electric Light Association. Mr. Barre has also recently paid a visit to San Francisco, where he has been in important conferences with committee members.

Walter F. Meier, corporation counsel, accompanied by hydroelectric engineer C. F. Uhden, Seattle, was in Portland recently, presenting data to District United States Forester George H. Cecil, covering the preliminary work contemplated by Seattle on the Skagit river power project. An outline of just what the city proposes to do at the power plant site and other locations on the Skagit river was presented to federal authorities and it is expected that a permit will be granted in the near future.

Fred E. Buck of Stevensville, Montana, has been appointed engineer for the Montana Irrigation Commission created by the extraordinary session of the Legislature called last summer. Several new districts have been organized under this law that expect to use electric power for pumping. Mr. Buck is a graduate of the University of Montana with the class of 1906, has been city engineer of the city of Missoula, Montana, and has engaged in a wide engineering practice in Western Montana in previous years.

Edward A. Quinn, general superintendent of the San Joaquin Light & Power Corporation, with headquarters at Fresno, California, in conference with P. M. Downing, chief engineer of electric generation of the Pacific Gas & Electric Company, and A. E. Wishon, assistant general manager of the San Joaquin Light & Power Corporation, comprised the committee of three who have just recently decided on the tie-in at Newman, California, between the power lines of the Pacific Gas & Electric Company and the San Joa-

quin Light & Power Corporation.

Mr. Quinn has been engaged in the electrical business since his boyhood days, and coming West to San Francisco in 1895, was in the employ of the Edison Light and Power Company for a year and a half.

Later he entered the employ of the Standard Electric Company of California, which was one of the first large hydro-electric plants in the West, and assisted in the installation of the machinery in the most important substation on the system and in the completion of the big power house at Electra. He remained with this company four years and in 1905 went with the San Francisco branch of the Westinghouse Electric and Manufacturing Company. In August, 1907, he was tendered the position of General Superintendent of the Nevada California Power Company, with headquarters in Goldfield, in charge of operation throughout the mining camps in the southern part of Nevada, and adjacent territory in California. In 1910 he returned to San Francisco to go with the selling department of the Allis Chalmers Company and he was with this company when he received the offer to join the San Joaquin Light & Power Corporation.



Electricity when the publication was taken over by the McGraw-Hill Co., Inc., at which time he occupied the position of treasurer. Every good wish is heard on all sides for the success and attainment in affairs of the electrical industry he so richly deserves.

Albert Meinema, manager of the automobile equipment department of the Electric Appliance Company, San Francisco, has returned from an extended tour of the East. While on his trip, Mr. Meinema attended several conventions of importance to the automobile industry.

Chas. F. Farmer, of Missoula, Montana, has been appointed engineer for District No. 4 in Western Montana that is contemplating the raising of water electrically or otherwise from the Missoula river in order to irrigate several thousand acres of land in the lower Missoula and Frenchtown Valleys.

Frank B. Jewett, chief engineer of the Western Electric Company, was a recent Salt Lake City visitor. During his stay he gave a very interesting account of "Some War-Time Developments in Electrical Communication and Allied Fields" before the Utah branch of the American Institute of Electrical Engineers.

W. D. Ward, sales representative with the Pelton Water Wheel Company in San Francisco, has been made manager of the company's Atlantic division with headquarters in New York City. On the eve of his departure to assume his new duties Mr. Ward was tendered a dinner at the San Francisco Engineers' Club by a number of local engineers.

C. C. Moore, president of C. C. Moore and Company, engineers of San Francisco, has recently been chosen president of the San Francisco Council of the Boy Scouts of America. Mr. Moore has been greatly interested in the work of the organization in the past and has consented to accept the position in the interest of the boys of the community.

Aubrey Drury, associate editor of the Journal of Electricity, has been appointed secretary of the Foreign Trade Club of San Francisco. William E. Hague, whom he succeeds in this office, is one of the partners in Hague & Co., Exporters, established in the Monadnock Building, San Francisco. Early in the year Mr. Hague leaves for an extended business trip to Siberia.

F. D. Fagan, district sales manager, Edison Lamp Works, San Francisco, was chairman of a meeting of electrical men held at the Jonathan Club, Los Angeles, on Monday, November 24th, to discuss the proper voltage lamp for use in Southern California. It was decided that the proper lamp was 110 volts, for use in Los Angeles and throughout Southern California. J. A. Vandegrift of the National Lamp Works also attended this important meeting.

F. H. Woodward, manager of the Great Western Power Company, and Superintendent Heron had the unpleasant experience of finding, after attending an electrical dinner in



Meeting Notices for Electrical Men

(Among notable meetings in San Francisco during the past two weeks are the dinner of the California Electrical Cooperative Campaign on November 15th, and the meetings of the Engineers' Club and the Contractor Dealers. Important gatherings at Del Monte are announced for the coming week.—The Editor.)

New Officers for Engineers' Club of San Francisco

Officers and directors for the Engineers' Club of San Francisco have been elected for the coming year. Ely C. Hutchinson, manager of the engineering and sales department, Pelton Water Wheel Company, San Francisco, has been chosen president. The other officers are: J. E. Woodbridge, 1st vice-president; Edwin Duryea, Jr., 2nd vice-president; Charles C. Hardy, treasurer; Allen G. Jones, secretary. The new directors are: Bruce Lloyd, Charles E. Townsend, A. E. Chandler, B. P. Legare, Abbot A. Hanks, E. O. Shreve, A. H. Halloran and W. G. Vincent, Jr.

President Hutchinson has nominated the chairmen of

the various committees for the ensuing term. The important Admissions Committee consists of Abbot A. Hanks, chairman, representing the and Telegraph Company, Riordan and Roy H. Elliott, representing the mining engineers; Nathan A. Bowers and E. J. Schneider, representing the civil engineers; E. C. Jones and W. W. Hanscom, representing the mechanical engineers; and L. S. Ready and J. A. Koontz, representing the electrical engineers. The chairmen of the other committees are: Finance committee, E. C. Bumsted; House committee, C. C. Brayton; New Membership committee, W. G. Vincent, Jr.; Entertainment committee, A. H. Halloran.

Electrical Contractors and Dealers' Association of San Francisco

An amendment to the by-laws of the Electrical Contractors and Dealers' Association, raising the initiation fee from \$100 to \$500, was passed at the meeting of November 14th. The new initiation fee is effective January 1st, 1920. At this meeting W. D. Kohlwey reported on the progress of the Retail Advertising Page idea in the San Francisco newspapers. W. F. Brainerd urged the members of the association to attend the "Get-Together Dinner" of the California Electrical Cooperative Campaign, November 15th. L. R. Ardouin, secretary of the association, told of the plans for "Contractors' Day" at the San Francisco Electrical Development League luncheon, November 17th.

At the session of November 21st, it was decided that the conference committee of the association should meet once a week. The necessity for filing of bids on work out of the city was emphasized by President Clyde Chamblin. Captain Howard Angus, secretary of the California Electrical Cooperative Campaign, and M. T. Dolman, manager of sales promotion bureau, Pacific States Electric Company, addressed the meeting on the advisability of electrical contractors advertising as a unit in the daily newspapers, as has already been done in Los Angeles.

Lecture on "Electrical Communication in War Time" by Dr. F. B. Jewett

Dr. F. B. Jewett, chief engineer of the Western Electric Company, spoke on "Some Wartime Developments in Electrical Communication and Allied Fields," in Native Sons' Hall, San Francisco, on Monday evening, November 24th, before an enthusiastic audience of more than 400 people. He appeared under the auspices of the San Francisco section, American Institute of Electrical Engineers.

W. G. Vincent, Jr., chairman of the local section, gave the first words of welcome to the gathering, and introduced C. W. Burkett, chief engineer of the Pacific Telephone

chemical engineers; B. M. San Francisco, who acted as chairman of the evening. Mr. Burkett, in presenting Dr. Jewett to the audience, outlined his notable services in both civil and military fields. As Lieutenant-Colonel in the Signal Corps, U. S. Army, Dr. Jewett had an excellent opportunity to observe many phases of wartime activity in the development of specialized electrical apparatus, and contributed much toward perfecting devices to detect hostile submarines. Best known for his work in telephone communication, Dr. Jewett has had a leading part in the development of the remarkable "telephone repeater."

In beginning his address, Dr. Jewett told of the methods used in building up a Signal Reserve Corps before the war, so that at the outbreak of hostilities there were experts ready to set to work in the further development of electrical communications. He paid particular

tribute to the efficient labors of Colonel J. J. Carty, who laid out the lines of communication for the American Expeditionary Force in France. High praise was also bestowed upon Colonel A. H. Griswold and the telegraph battalion organized in San Francisco for overseas service.

In the course of his remarks, which were illustrated with excellent stereopticon slides, Dr. Jewett touched on the developments in land communication, especially by telephone and telegraph, and also devoted much time to the radio telephone, with its applications both to aircraft and to submarine destroyers and other vessels of the navy. The detection of hostile submarines by electrical listening devices was also discussed, and mention was also made of the remarkable sound-ranging apparatus evolved by electrical engineers with the allied armies.

Dr. Jewett concluded the evening's instructive program by displaying some moving picture films, made under the direction of the Western Electric Company, showing several of the foremost engineering triumphs of the war.

BUILDERS OF THE WEST — LXVI



LIEUT.-COL. W. B. GREELEY

During the past month the nation from one end of the country to the other has celebrated the anniversary of the signing of the armistice, Nov. 11, 1918. Many important factors contributed to the successful conclusion of the world war, but it is generally admitted that the engineer and his wonderful activities must be given paramount consideration to all others. In this work engineers of the West of the type of Herbert Hoover have written a page in history never to be forgotten. This issue of the Journal of Electricity is affectionately dedicated to Lieutenant-Colonel W. B. Greeley, Associate Forester at Washington, D. C., who is a product of the West and its best traditions. The work of the Twentieth Engineers and the effective accomplishments of the Forestry organization in France, in which Colonel Greeley had a substantial part in organization and direction, is a record of achievement of which the West is justly proud.

San Francisco Electrical Development League

Featuring "Armistice Day," the San Francisco Electrical Development League on November 10th held its luncheon meeting in the Palace Hotel, each member bringing as his guest a man in the electrical industry who had seen service in the World War. The entire program was patriotic in character, and one of the effective "stunts" engineered by F. E. Boyd, chairman of the day, was the introduction of three Boy Scouts, costumed to represent the characters of the well-known painting, "Spirit of '76," who marched about the banquet hall playing patriotic airs while the crowd stood at attention. Captain A. E. Graupner, Captain W. B. Mel and Lieutenant A. J. Callaway were speakers. Captain Howard Angus, secretary of the California Electrical Cooperative Campaign, told of the magnificent fighting of the American doughboy in the Argonne drive.

"Contractors' Day" at the League, on November 17th, drew out a record attendance. A decided triumph was scored by the presentation of the clever comedy, "Take the Offmug Apartments F'rinstance," from the pen of L. R. Ardouin, secretary of the San Francisco Association of Contractors and Dealers. C. J. Newbery, C. F. Butte, C. B. Kenney, Clyde L. Chamblin, E. E. Browne and Percy Schwartz were the members of the association who enacted the skit, which depicted conditions in the electrical contracting business in "5000 B. C." and later. The contractors were congratulated upon the entertaining program they had furnished for the edification of the League.

Major Volney D. Cousins, equipment specialist, Pacific Telephone and Telegraph Company, spoke on "Some Recent Telephone Transmission Developments" at the League meeting of November 24th. He showed how the unusual transmission problems of the past few years have been solved, using charts and diagrams to illustrate his talk. The development of the "telephone repeater," which makes long distance telephoning possible over almost any length of line, was described, and Major Cousins predicted that through the use of this device country-to-country telephoning will be in the near future a commonplace feature of our daily life. A telephone conversation between San Francisco and Buenos Aires, he declared, could be carried on with ease. Mr. L. J. Brown, assistant sales manager of the Western Electric Company, San Francisco, acted as chairman of the day.

CALIFORNIA ELECTRICAL COOPERATIVE CAMPAIGN DINNER IN SAN FRANCISCO NOVEMBER 15TH

The California Electrical Cooperative Campaign "Get-Together" Dinner, held in the banquet hall of the Commercial Club of San Francisco, on the evening of November 15th, was one of the most successful events of this kind which has ever been held on the Pacific Coast. More than 350 men

associated with the electrical industry were in attendance. John A. Britton, Vice-president and General Manager of the Pacific Gas & Electric Company, was chairman of the evening, introducing the speakers with characteristic tact and effectiveness.

At the speakers' table, besides Chairman Britton, sat A. Emory Wishon, Assistant General Manager of the San Joaquin Light and Power Corporation, and President of the Pacific Coast Section, N. E. L. A.; R. H. Ballard, Vice President of the Southern California Edison Company, and President of the National Electric Light Association; Lee H. Newbert, Manager, Commercial Department, Pacific Gas & Electric Company, and Chairman of the Advisory Committee of the California Electrical Cooperative Campaign; E. O. Edgerton, Harvey D. Loveland and Frank R. Devlin, all of the California State Railroad Commission.

Throughout the evening patriotic songs appropriate to the "one year after the Armistice" season were sung by the gathering, and special musical numbers were presented by the Masonic Quartet.

In opening the discussion of problems affecting the industry, Lee H. Newbert told of the work done by the California Electrical Cooperative Campaign during the past year, and predicted even more effective activity during the coming twelve months. He showed how the staff organization of the Campaign had increased, and laid particular emphasis on the importance of the special electrical advertising pages and sections which are to be placed in the chief newspapers of California through the cooperation of the various electrical interests. Continued support of the Campaign forces was strongly urged by Mr. Newbert.

An eloquent exposition of his "Self-Interest Plan for the Electrical Industry" was made by A. Emory Wishon. Much new illustrative material was brought out in the course of the talk, and the whole analysis of the business situation was at once so novel and definite that Chairman Britton, in his after-remarks upon the discussion, termed Mr. Wishon "a Columbus of the Industry." The speaker showed actual charts and plans of the development of the San Joaquin Light and Power Corporation, as indicating the manner in which all the public is going to benefit in dollars-and-cents profit through the furtherance of power projects in California.

R. H. Ballard gave a comprehensive view of the impressions he had gained during his recent tour of the East in his capacity as President of the National Electric Light Association. The electrical men of the nation, he assured the gathering, are watching with much interest the progress of the California Cooperative Campaign. "Forward, California," he said, is the slogan for the year in electrical affairs, and he expressed the confident belief that a great material expansion is before the industry in the next decade. During



A large attendance and great enthusiasm marked the dinner given by the California Electrical Cooperative Campaign in San Francisco on November 15. The dinner was in the nature of a get-together event, and a number of important speakers were on the program.

this period, Mr. Ballard estimated, \$250,000,000 would be required to finance electrical development in this State.

E. O. Edgerton, President of the California State Railroad Commission, spoke also of the future of the industry in California, and was inclined to think that Mr. Ballard's figure of \$250,000,000 for the extension of the industry within the next ten years was decidedly conservative. The electrical industry, he declared, has before it a great responsibility to the public, which he had no doubt would be met with the same wise management and policy which at present is directing its progress. Mr. Edgerton spoke with gratifying directness as to the desire for friendly relations between the power companies and the regulating commissions which represent the public. The commissions, he made plain, wish the industry to prosper and make a legitimate profit, and he expressed it as his opinion that the public utilities are today the best managed concerns in California, meriting the public confidence.

The meeting closed with the singing of the "Electric Song of San Francisco," to the tune of "Auld Lang Syne."

A. I. E. E., Utah Section

"Modern Illuminating Engineering" was the subject of an address given by A. L. Powell, illuminating engineer in the laboratory of the Edison Lamp Works of Harrison, N. J., before a meeting of the Utah Section, American Institute of Electrical Engineers, at Salt Lake City, November 26.

Meetings at Del Monte

A meeting of the Advisory Committee will be held at the Hotel Del Monte on December 2nd, at 10 a.m. On December 3rd there will be a meeting of the Commercial Committee of the Pacific Coast Section of the N. E. L. A., followed on December 4th, 5th and 6th by a meeting of the Electrical Supply Jobbers. The Executive Committee of the Pacific Coast Section of the N. E. L. A. will also meet at Del Monte on Dec. 5th.

Electrical Contractors and Dealers in Portland

The evening of Nov. 14th, several of the jobbers and dealers handling washing machines and vacuum cleaners met in a preliminary meeting at the Portland Chamber of Commerce for the purpose of organizing a "special section" of the Oregon Association of Electrical Contractors and Dealers. Mr. Scott acted as temporary chairman. The purpose of the organization is to formulate a uniform policy of handling time payment business along these lines.

Representatives of the following companies were present: J. C. English Company, Pacific States Electric Company, Fobes Electric Company, Beaver Electric Company, Stubbs Electric Company, Smith-McCoy Company, and Scott Electric Company.

WESTERN MEETINGS

November 12.—Electrical Cooperative League, Los Angeles. E. Earl Glass, Engineer County Flood Control of the County of Los Angeles: "Flood Control."

November 19.—Electrical Cooperative League of Los Angeles. Jas. W. Foley: "Citizenship."

November 22.—A. I. E. E., Denver Section: "Late Developments in Industrial Store and Residence Lighting," by A. L. Powell, illuminating engineer, Edison Lamp Works, G-E Co., Harrison, N. J.

November 25.—Joint meeting in San Francisco under the auspices of the California Section of the American Chemical Society. Symposium on the Application of Chemistry to Engineering. Professor J. M. Hyde, Am. Inst. M. and M. Engrs., Stanford University; Professor C. G. Hyde, A. S. C. E., University of California; S. Barford, A. I. E. E., San Francisco; C. F. Braun, A. S. M. E., San Francisco; Professor R. E. Swain, American Chemical Society, Stanford University.

December 2.—American Association of Engineers, San Francisco. Dr. Ira B. Cross: "What Kind of Engineers the World Needs." All engineers are invited.

HAPPENINGS IN THE INDUSTRY

ELECTRICALLY DRIVEN SHIP LAUNCHED

The dreadnaught California, sister ship of the New Mexico, launched at Mare Island, California, on November 20th, is electrically equipped throughout, as well as being electrically propelled. There are eight steam boilers, two generators developing 15,000 hp. each, and four 7,000 hp. motors.

Besides supplying her driving power, electricity is used to hoist ammunition, rotate the turrets, operate the fourteen-inch guns, steer the ship, raise and lower the anchor, pump fresh and salt water, operate the machinery in the machine shop, carpenter shop and printing establishment, supply fresh air for ventilation, raise and lower the boats, operate the refrigerating plants, searchlights and radio equipments. In the kitchen electricity peels the potatoes, washes the dishes, makes the ice cream, grinds the meat, mixes the dough, cuts the butter, and acts as a labor-saver in many other ways.

PUBLIC UTILITY TRANSACTION

The Pacific Gas & Electric Company has perfected a preliminary agreement with the Sierra & San Francisco Power Company to lease and operate all the properties of that company for fifteen years. Application will be made to the State Railroad Commission for permission to complete the agreement.

The principal properties and power house of the Sierra & San Francisco company are in Tuolumne county, and it

owns a power line to San Francisco, where it supplies the United Railroads with power. The company also owns a distributing system in the San Joaquin valley and operates in Stanislaus and Calaveras counties.

The proposed lease will enlarge the facilities and equipment of the Pacific Gas & Electric Company. Should the Railroad Commission rule favorably, the Pacific Gas & Electric Company will make improvements that the Sierra Light & Power Company has in consideration and probably will make extensions and other improvements in addition.

NEW PIPE INSTALLATION

The Redwood Manufacturers Company of San Francisco have just been awarded a contract by the Butte Water Co. of Butte, Mont., for 24 miles of 26 and 24-in. Remco continuous stave pipe for water supply. This line will run from the pumping plant on the Big Hole River to a connection with the city's system and will be installed in the summer of 1920. The contract amounts to about \$400,000.

The awarding of this contract was largely due to the fact that in 1892 Redwood Manufacturers Co. installed a line of Remco continuous stave redwood pipe for the same company, 46,000 ft. in length and 24 in. in diameter from a reservoir in the mountains to a connection with the city's system at Butte. That line operates under 160-ft. static head. One of the peculiarities is that the water is pumped from the streams on the Atlantic side of the continental

divide to a reservoir located on the Pacific side and that the water which, if allowed to take its natural course, would flow into the Gulf of Mexico, finally after flowing through the pipe reaches the Pacific Ocean.

In 1899 the Redwood Manufacturers Co. installed for the Butte Water Co. 64,700 ft. of 24-in. Remco pipe and 32,600 ft. of 26-in., which was an additional supply for the city of Butte. This line runs from the Big Hole river to a connection with the city's system on the outskirts of Butte and is under a pumping pressure averaging 200 ft. static head.

The lines installed in 1892 and 1899 were thoroughly examined in October, 1919, and found to be free from any deterioration whatsoever. The redwood shows no decay and is in its original condition. The pipe lines have never ceased operation for a single day since they were installed notwithstanding the fact that they are located in climate which goes 50 deg. below zero at times.

STREET RAILWAY RULINGS

Authorization of a zone system of fares for the electric street railways of San Diego was decided on by the State Railroad Commission, the decision being the first on record in which the one-fare system for street railways has been departed from in California. The decision lays down several new precedents for the operation of street car lines in the state.

The decision authorizes an inner, or short-haul zone in which fares shall be 5 cents, and an outer, or longhaul, zone, fares to be 10 cents. Interurban fares are readjusted. Ticket books—four tickets at 7½ cents and sixty-ride books at 6½ cents—are ordered.

Application of the street railway company to discontinue lines in East San Diego and Point Loma is denied, and radical changes in paving laws are recommended to the San Diego municipal government to obviate the necessity for expensive types of paving work by the street car company.

By a unanimous decision of the board of arbitration considering a scale of wages for the car men and other classified street railway employees of the Portland Railway, Light & Power Company, a schedule has been signed for the period from October 1, 1919, to April 30, 1920. Wages of platform men are raised from a maximum of 56 cents an hour to a maximum of 62 cents an hour and that of other classified employees to a scale corresponding with that figure approximately.

BILLS OF INTEREST TO ENGINEERS

The following bills of interest to engineers, now before the Senate and House of Representatives, are listed by the National Service Committee of the Engineering Council in a recent bulletin:

- S. 3395, to discontinue the improvement to provide a channel extending from the sea to the Charleston Navy Yard.
- S. 3399, authorizing the use of radio stations under the control of the Navy Department for commercial purposes.
- H.R. 10433, to provide for disposal of public lands in Arizona, New Mexico, Nevada, and Utah, containing deposits of copper at depth.
- H.R. 10453, to provide for the termination of Federal control of railroads and systems of transportation; to provide for the settlement of disputes between carriers and their employees; to further amend an act entitled "An act to regulate commerce," approved Feb. 4, 1887, as amended.
- H.R. 10483, to provide for the construction of a waterway from the Ohio River to Lake Erie.
- H.R. 10484, to provide for an examination and survey of San Luis Obispo harbor, California.
- H.R. 10510, to provide that the United States shall cooperate with the states in promoting the health of the rural population of the United States.
- H.R. 10537, making appropriations for the purchase of airplane and aviation equipment for the Aviation Service of the U. S. Army.

NEW PLANT IN ASTORIA

The new plant of the Pacific Power & Light Company which is being erected on the north shore of Youngs Bay, will include not only electric power generating machinery, but also a gas generating plant, both of which will be of sufficient capacity to meet the demands caused by the growth of the

city for years to come, or until the plant is taxed to approximately three times the present demands.

The completed plant will represent an outlay of approximately \$750,000. Present indications are that it will be completed in from six to eight months.

The buildings which will house the electric generating plant will be erected close to the line of the bulkhead which has just been completed, and will be of the usual electric generating plant type, of reinforced concrete construction, and will measure approximately 90 by 100 feet, and 37 feet above grade. A basement in which the boilers and machinery will be installed will be under a part of the structure.

It is proposed to install one 3,000-kw. steam operated turbine generator, capable of producing current up to 11,000 volts. This will be a General Electric Company machine, and practically all the equipment of the new electric plant will be the product of this company. The building will be of sufficient size to permit the installation of additional equipment to produce 5,000 additional kilowatts when the demand requires. The boilers will consist of three 60-hp. boilers of the high-pressure type, and the boiler room will be so constructed as to afford ample room for additional equipment when it is installed.

NORTHWEST HEATING PLANT

The Northwestern Electric Company's steam heating plant is now supplying heat to 90,000,000 cu. ft. of space in office buildings, hotels, etc. They consume 10,000,000 cu. ft. of "hog fuel," refuse from approximately 100,000,000 board feet of lumber. To furnish oil to the buildings served by this company it would take 150,000 bbls. per annum, and 5,000 tank wagons to deliver it. The equivalent in slab wood would be 60,000 cords, and there would be 1,000 loads of ashes.

The Northwestern Electric Company have obtained the contract to furnish all the electric power for the new factory of the Aladdin Building Material Company's plant at Kenton. There will be approximately 300 hp. in the first unit.

TECHNICAL EDUCATION

The Massachusetts Institute of Technology gives the following approximate figures among those listing the number of former students in various lines of industry. The former students number over 14,000, 7,015 being graduates:

	Number	Percentage of Graduates
Civil Engineers	262	.037
Mechanical Engineers	446	.063
Mining and Metallurgical Engineers.....	361	.05
Electrical Engineers	560	.08
Marine Engineers	44	.0063
Electro-Chemical Engineers	28	.004
With Construction Companies	77	.01
With RR. and Street RR. Companies.....	322	.046
Heating and Ventilating	21	.003
With Ship and Marine Engineering Works	14	.0021
With Gas Companies	36	.005
With Telephone and Telegraph Companies	45	.005
With Electric Companies	77	.0099

It is stated that representatives of the General Electric Company, the Western Electric Company, the Westinghouse Electric & Manufacturing Company, the American Telephone & Telegraph Company and others visit the Institute every year and interview such of the students as are interested in the kind of work they represent.

The research laboratories of the Electrical Engineering Department of the Institute are at present carrying on research for the American Telephone & Telegraph Company. The Institute has yearly contracts with the General Electric Company, the American Telephone & Telegraph Company and the Goodyear Tire & Rubber Company for research work. Besides this the research laboratories do work for the Vacuum Oil Company, the National Tube Company, the National Electrolytic Company and many others.

The Electrical Engineering Department is equipped with full-sized dynamos, so that the students experiment with the same apparatus which they will use in industrial life.

NEW POWER SCHEME ADVOCATED

Establishment of an interstate hydroelectric system by Portland and Vancouver as a means of building up these cities and adjoining communities is proposed by A. L. Haley, an engineer retained by the Port of Vancouver, after a careful study of power development in the middle western and eastern states. Within a radius of 100 miles from Portland, Mr. Haley said, 500,000 horsepower of electric energy can be developed and this would mean wonders in the way of encouraging and building up the industrial life of the two cities.

"There is in the Cowlitz 120,000 horsepower, only 60 miles distant, and 300,000 horsepower in the Deschutes, less than 100 miles away," said Mr. Haley. "In addition there are valuable falls on the Santiam, not to speak of the enormous strength in the falls of the Columbia at Celilo, where government figures show a mean annual average of 300,000 horsepower available.

"If it could properly be brought before the people of Portland and Vancouver, so they would understand the benefits they would receive from utilization of the waterfalls, there would be no trouble in getting a bond issue of \$25,000,000.

"I am told it costs Portland \$12,000 a day for its fuel and electric current, or \$4,980,000 per annum. Much of this could be saved by supplying ourselves with electricity for all purposes. Water power developed on public grounds by private individuals or private corporations must pay a government tax for the use of the water, gauged at 10 cents per horsepower per year at the beginning and increased to \$1 per horsepower per year in ten years.

"Water power developed by municipalities pays no tax at all, so if Portland and Vancouver districts should issue bonds and develop, say 500,000 horsepower, the city would be saving \$500,000 a year in government taxes, in addition to its citizens getting their electricity at cost.

"I suggest that Portland people unite with the citizens of Vancouver and build an interstate power plant of sufficient magnitude to serve the requirements of both cities."

SOUTHERN CALIFORNIA EDISON COMPANY BOND ISSUE

To secure funds to carry out development projects made necessary by the hydroelectric situation in Southern California, the Southern California Edison Company has applied to the Railroad Commission for authority to issue bonds to the amount of \$7,500,000. Of this amount \$1,842,000 is to be used to reimburse the company for expenditures already made for the construction, completion, extension and improvement of its facilities and for the improvement and maintenance of its service. The balance is to be expended from time to time as the needs of the company demand.

It is proposed to sell the bonds at not less than 93 and interest. They are to be listed as general and refunding mortgage 6 per cent, twenty-five-year gold bonds of the series of 1919.

In a supplemental petition filed by the Edison Company the Commission is asked to amend a previous order so as to permit an exchange of debentures at par for bonds at 97, the amount involved totaling \$1,977,000. The amendment is made necessary, says the company in its petition, by the apparent unwillingness of the debenture holders to exchange the debentures for bonds, par for par.

NEW PLANT FOR STOCKTON

A \$5,000,000 plant to manufacture a new four-pull tractor will be erected in Stockton by the Kroyer Tractor Manufacturing Company. Construction of the plant will begin in the spring and operations within a year.

The plant will cover eighty acres at the eastern edge of the city on the Cherokee lane. The first season's output will be 1500 tractors, it is estimated.

The buildings will be modern, designed according to the latest ideas. The layout of the buildings has been so

arranged that additional units may be added from time to time.

TRADE IN DYESTUFFS

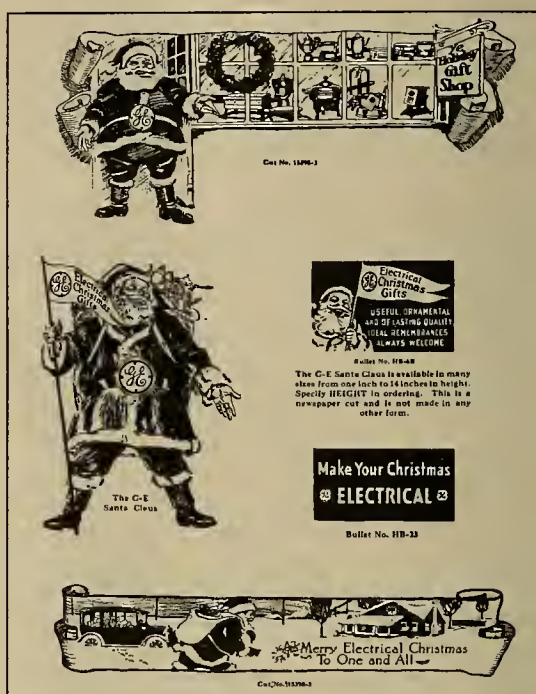
The following announcement comes from the War Trade Board Section of the Department of State:

The War Trade Board Section of the Department of State is now prepared to make allocations providing for the importation of German dyes (other than vat dyes) in amounts sufficient to supply the requirements of the consumers of the United States for the six months' period, November 15, 1919, to May 15, 1920.

Allocations will be made only when the articles desired to be imported are unobtainable from United States sources, or, though obtainable from United States sources, are unobtainable on reasonable terms as to prices, quality and delivery.

Importations of these articles will be governed by rules and regulations which will be announced as soon as the necessary details have been completed. In the meantime, dye consumers are requested to file with the War Trade Board Section, as soon as possible, applications and undertakings on forms which will be supplied on request, by the Bureau of Imports, War Trade Board Section, Washington, D. C., in which will be stated estimates of the amounts of the above mentioned dyes which will be required for consumption during the above mentioned six months' period.

WHAT MANUFACTURERS ARE DOING FOR CHRISTMAS



A page of electrotypes designed by the General Electric Company especially to assist dealers in their Christmas sales campaigns.



Two pages from the Hotpoint book of Christmas plans. The new folder which is shown at the left carries the idea of the Electrical Christmas to the Christmas shopper.

NATIONALIZING ELECTRIC POWER IN GERMANY

A law nationalizing the electric power of the German Empire has been published by the government. Germany has over 4,000 power establishments, and the splitting up of their activities is held to cause serious waste. The scheme is made imperative by the loss of the Saar coal fields and the obligation to supply coal to the Allies. The water power, which is mostly to be found in South Germany, is primarily to serve local industries, but an agreement will be made with those generating electricity from coal in central Germany. Power stations belonging to states and municipalities will not be disturbed, but the large plants belonging to private capital will be taken over and nationalized by the central government. The government will buy up shares, so that the present organizations can remain intact. The nationalized works are not to be considered as a source of revenue, as the government holds that cheap power for industry is more important than fiscal interests. The private capital in electrical power works in Germany is estimated at 1,000,000,000 marks and the use of electrical power in that country has increased from 4.43 billions of kilowatt-hours in 1907 to 22 billions in 1917.

ELECTRICITY FOR RECONSTRUCTION IN FRANCE

The coal shortage in France continues to be serious though some relief has been afforded by the arrival of American coal. Dispatches from Berlin indicate that the Ruhr region is about ready to deliver coal to France and that about one million tons may be expected the first month. Discouraging reports have been made by the Mining Society of Lens after investigating the damage inflicted by the Germans on the Lens collieries. Eighteen months will be required to pump out the water, according to their estimate, and work cannot be resumed even on the copper seams until the end of 1920. They will not be in condition to produce on their normal-pre-war scale for ten years. The water is oozing out from the lower level mines and causing much damage to the countryside. Powerful electric pumps, which will obtain their power from the generating station at Harnes, have been ordered for the work of clearing the mines.

Every time a nation feels the pinch resulting from a shortage of coal and a dependence on foreign sources for this essential, a stimulus is given to the development of the internal hydroelectric resources. A bill has been submitted to the Chambre des Deputes providing for the utilization of the water power of the River Rhone. Twenty hydroelectric power stations are proposed in the bill, to produce an average of 715,000-hp. each. It is estimated that this would be equivalent to 5,000,000 tons of coal annually, or nearly one-eighth of the French coal output before the war. Fifteen years would be required for this work and the expenses are estimated at \$500,000,000. The proposition as it now stands is to grant a concession for the whole undertaking to a company with a capital of \$50,000,000 and the privilege of issuing bonds to ten times that amount. The bonds would be guaranteed by the state, which would appoint two-fifths of the membership of the administrative council, including the president.

ELECTRICAL GOODS FOR ARGENTINA

A most promising future for American electrical goods exists in Argentina, Brazil, and Uruguay, according to a report just made to the Bureau of Foreign and Domestic Commerce, Department of Commerce, by Trade Commissioner Philip S. Smith. The use of electricity is widespread in all three countries.

In Argentina and Uruguay the high cost of imported fuel and the lack of water power limit the use of electricity to some extent, but in Brazil the immense amount of water power available makes the electrical field a peculiarly attrac-

tive one to manufacturers of electrical equipment. As this water power is found for the most part in the coastal section of the country, it will be available for industrial enterprises and for general lighting, heating, and power purposes in the numerous cities of this section, which includes the greater part of the population of the country.

COPPER WIRE TRADE

"Foreign and domestic orders for wire, and copper goods generally, are increasing rapidly," says a prominent manufacturer long connected with the trade. "Orders from Europe and South America show great increase lately. Old-established European firms of the highest repute are especially desirous of obtaining agencies for American goods. This, in my opinion, is one of the most encouraging features other than the rapid increase in orders accompanied by highest New York credit.

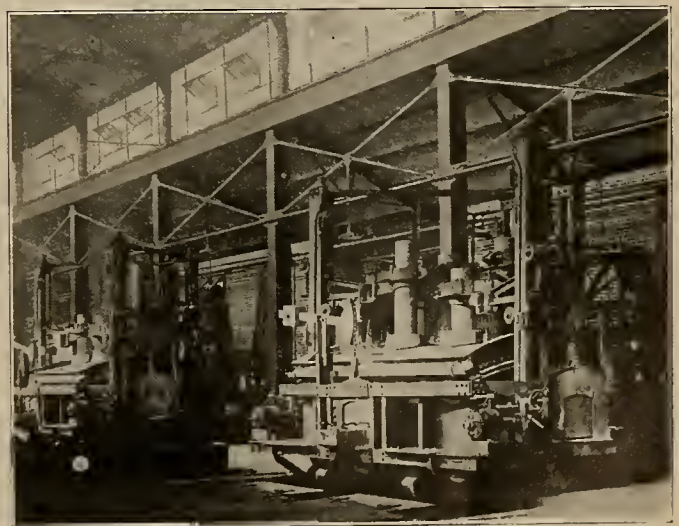
"This anxiety to obtain agencies is partly due to the fact that companies are slightly more lenient in regard to credits when an order is booked by an agent than when sent in direct. But the main reason appears to be anticipation of large business about to be done with America, especially in copper wire products.

"Domestic orders are increasing, but not quite so rapidly as bookings for foreign account. Good weather fixes the time of most wire installations, and normally good weather ordering is much larger than winter ordering. Labor troubles have held up such ordering greatly this summer. But now orders are being forced through by press of need in goodly amount."

ELECTRIC STEEL MAKING

With further reference to the article by Harry Etchells appearing in the October 1st issue of the Journal of Electricity, the Electric Furnace Construction Company, Finance Building, Philadelphia, the manufacturers of the "Greaves-Etchells" electric furnace, send a supplementary statement to the effect that the typical "Greaves-Etchells" electric furnace described in that article is of 6 tons rated capacity—although charges as high as 9 tons have been made in the furnaces. The copper plate to which is attached the third leg of the electric power supply simply lies on the inside of the furnace body, and the lining is rammed solid on top of this. There are no projections either of copper, steel or carbon through the furnace lining, and the linings have been proved to be extremely strong and durable.

Furnaces of this type are at present installed at the Mare Island and Puget Sound navy yards.



A typical installation of the Greaves-Etchells electric furnace which was described in detail in the October 1st issue of the Journal of Electricity.

POWER AND IRRIGATION PLANS

Irrigation and water power developments contemplating a total expenditure of more than \$11,440,000, and including irrigation projects for 214,110 acres of land in Northern California, are included in the applications for permits to appropriate water, filed with the State Water Commission recently.

Among the power plant petitions is that of the Western States Gas and Electric Company of Stockton, which asks to take water from the south fork and from the north fork of the American river for power purposes. The San Joaquin Light & Power Corporation of Fresno asks permission to take 900 cubic feet a second from the San Joaquin river, through diversion works, the cost of which is estimated at \$4,000,000.

The Mokelumne River Power and Water Company of San Mateo also asks extensive permits for use of water for power purposes. The estimated cost of diversion machinery at the south fork of the Mokelumne River is \$186,000, at the north fork, \$502,500; at the middle fork, \$600,000; the Esperanza creek spillway, \$25,000; and at the south fork tributary, \$650,000.

Among the irrigation projects is a proposal of the Santa Cruz County Farm Bureau, which asks permission to appropriate waters from Soquel creek, Bonciforte creek and San Lorenzo river to irrigate 12,000 acres. The Modesto Irrigation District asks a permit to take water from the Tuolumne river, to use on 100,000 acres, through the Don Pedro storage reservoir. The estimated cost of this work, according to the permit application, is \$3,100,000 for dam and reservoir, with other expenditures due for power and development.

The Mendota Irrigation District, Fresno County, asks permission to take water from Fresno slough, the north fork of the Kings river, to irrigate 87,118 acres, estimated cost of flumes and other facilities to be \$500,000, according to the petitioners' estimate.

Roger W. Olmstead, Manteca, seeks permission to divert water from the San Joaquin, by diversion works, through the Littlejohns creek tributary in Calaveras County, estimated cost \$750,000, the purpose to be electrical power. He files a similar application for the waters of Black creek, tributary to the Stanislaus river, estimated cost \$1,250,000, also for power purposes.

Besides these applications forty-one more are before the water commission, including applications for smaller farm irrigation projects and a number of applications for supply of power expansion in the southern part of the State.

ELECTRIC PASSENGER SHIPS FOR PACIFIC COAST

The installation of two 19-knot passenger vessels equipped with the turboelectric drive in the service between San Francisco and Los Angeles has been planned by a group of New York shipping men, according to advices recently received. The telegraphic announcement states that machinery is now being installed, and the vessels will be on the Pacific the latter part of April.

Shipping men who heard the announcement were not surprised to learn that the vessels will be electrically driven, for it is known that a number of steamship concerns have prepared tentative plans for the construction of the new type of passenger ships.

It is known that one of the local shipbuilding concerns is negotiating for the Pacific Coast rights to manufacture and install turboelectric units and that it is planned to have several vessels of this class built here during the next year.

The attention of the owners and builders to the electric drive was attracted by the success attained with the collier Jupiter and the super-dreadnaught New Mexico, both vessels having been in use long enough to demonstrate the practicability of the motor-driven craft.

MACHINERY IMPORTS IN JAPAN

According to the Osaki Mainichi, orders from Japan for British or American machinery are very large at present. The demand is said to be concentrated on machinery pertaining to electricity, electric light and electric trams, steam boilers and spinning machinery. As regards the increase in the demand for electrical machinery, it is due to the development of communications and industry and also to the large increase in the price of coal. On the other hand, many capitalists who intended to import machinery for the enlargement of their business during the war, but hesitated on account of the enormous rise in the price of iron, have now made up their mind to import, as they have realized that prices will not decrease for some time to come, in view of the present labor and other difficulties prevailing in Europe.

TRADE NOTES

New Electrical Firm —

Saxe & Hussey have opened an electrical appliance store at 315 Pine street, Seattle. Aside from serving the local trade it is the intention to enter the export field, including Australia, New Zealand, China, and Japan in the territory to be covered. Victor L. Saxe, one member of the firm, has been with the North Coast Electric Company at Seattle for the past five years. Kenneth P. Hussey, the other member, has been with the State Bank of Seattle for the past four years with the exception of nine months during the war, when he served in the signal corps and gained considerable experience in electrical matters. He is to handle the export end of the business while Saxe will have charge of the electrical appliance end.

Offices Re-opened —

The Richardson-Phenix Company, lubrication engineers and manufacturers, Milwaukee, Wis., have re-opened their Philadelphia offices in the Bailey Building under the management of George F. Fenno.

Western Offices —

The Safety Insulated Wire and Cable Company has opened offices at 616 Title Insurance Building, Los Angeles, in charge of E. H. Bill.

New Store —

A new store known as the Community Electric Shop is to be opened in San Francisco by George W. Brouillet and Chas. Fries, formerly of the Electric Railway & Manufacturers' Supply Company, and the Liberty Electric Company, respectively.

New Contract —

The Northwestern Electric Company have signed a contract for the power required to operate the new Olympic Feed and Serial mill of the Portland Flouring Mills Company. The amount of power required at once is approximately 600 hp.

Window Dressing Campaign —

The Edison Lamp Works are putting on a special window dressing campaign in San Francisco of Edison white mazda, black tissue and white lamps.

Court Decision —

In the suit of Harvey Hubbell, Inc. vs. the General Electric and Bryant Electric Companies, for infringement of Hubbell Patents Nos. 774,250 and 774,251 covering attachment plugs, decisions have been filed by Judge Thomas in the United States District Court, upholding the Hubbell Patents and finding infringement thereof. In the suit of Bryant Electric Company vs. Harvey Hubbell, Inc., charging infringement of their Burton Patent, a decision has been filed by Judge Thomas in favor of the defendants, finding the Burton Patent invalid.

NEW ELECTRICAL DEVELOPMENTS

(In line with the growing interest in better illumination for the factory as well as for the home is a new reflector with a luminous top. Other recent items in industrial development are a drum controller for locomotive motors, a special line of bell-ringing transformers, an electrical letter-opening device, and a new farm lighting equipment.—The Editor.)

IMPROVED REFLECTOR UNIT

The new luminous top reflector put on the market by the Benjamin Electric Manufacturing Company, is designed to give a soft light in the upper part of any room, at the same time improving the light on the working plane.



This new reflector unit gives out through a semi-translucent top a diffused light to the upper part of the room, thus utilizing the ceiling as a reflector.

Considerable attention is being given at this time to better lighting in industrial plants, and its influence upon efficiency. It is claimed that this reflector gives the effect of increased height to a room, thereby producing a sense of greater freedom of action among the workers. A small increase in the diffusion of light is noticed, sharp contrasts are reduced, and a better quality of illumination results.

Where line shafting and pulleys are present in the upper part of the room they are thrown into relief by the luminous top device, the liability to accident among those attending to repairs being thereby greatly decreased.

DRUM CONTROLLER FOR LOCOMOTIVE MOTORS

A drum type controller for series-parallel control of two series motors is one of the new products of The Cutler-Hammer Mfg. Co., of Milwaukee, Wis. This controller, which is provided with both a main cylinder and a reverse cylinder, is for use on storage battery locomotives using 250 volts or less.

The motors are accelerated by the main cylinder, which has seven points of control. A star wheel provides an interrupted motion to the lever, so the operator readily feels the speed points. The fourth point is the full series or low speed running point and the seventh the full parallel or high speed running point. All intermediate points are resistance points. The Wheatstone Bridge method is used for transition from motors in series to motors in parallel between the fourth and fifth points of control, and as the circuit is not opened, continuous torque is obtained during the transition. Arc barriers are provided between each contact finger, and strong magnetic blowouts prevent excessive arcing.

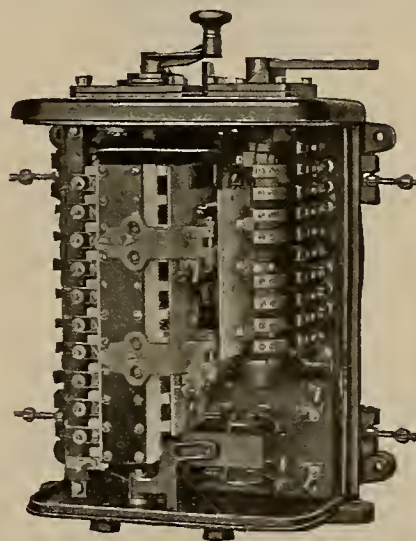
The reverse cylinder is positively interlocked with the main cylinder so it cannot be operated when the latter is in any but the "off" position. The fingers of the reverse cylinder are therefore not used for making or breaking the current; hence the contact parts will last indefinitely, and magnetic blowouts are unnecessary.

Two cutout switches allow either motor to be by-passed, if it becomes damaged in any way, and the locomotive operated by the other motor until repairs are made. When one cutout switch is thrown to by-pass its corresponding

motor, mechanical interlocks prevent closing the other cutout switch or operating the main cylinder beyond its full series position, thus eliminating the possibility of a short circuit.

A dust-tight and weatherproof construction is obtained by fitting the sheet metal cover under a ledge in the top and providing a rubber gasket between the edges of the cover and the cast iron frame.

This new controller has the following features of construction common to other C-H Drum Controllers: cast iron sections of cylinder clamped on square insulated shaft, using no keys or taper pins, thus making removal easy; cylinders readily removed from case by merely taking off top plates;



A new two-motor battery locomotive controller recently developed by Cutler-Hammer which has all parts liberally proportioned and readily accessible.

steel contact fingers of main cylinder mounted on square insulated metal shaft, which can be removed by taking out two cap screws; all fingers provided with drop forged copper tips of the non-stubbing type.

The contact fingers and segments may be adjusted or renewed without removing the cylinders from the drum case. Those on the reverse cylinder are exposed by merely loosening two thumb nuts and throwing back the blowout plate and arc barriers.

Most mine duty apparatus is employed where the service conditions are severe and delays in operation costly, consequently this new controller has its parts very liberally proportioned to prevent wear and breakage, and those parts which do wear are made accessible and easily renewable.

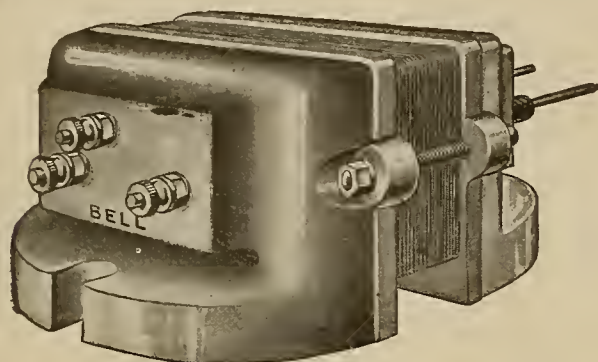
BELL TRANSFORMERS

A complete line of bell ringing transformers with blue glazed porcelain cases is being put on the market by the Standard Transformer Company of Warren, Ohio.

The heavy duty types, for apartments, school houses, and factories are 50-watt capacity with 6, 12 and 18 volts on the bell side. This lends a flexibility to this type of operating both short and long bell circuits from the same instrument. This condition is frequently met in this class of service, but never on residence bell circuits.

Formerly, this type was made with a cast iron case which has now been replaced with a blue glazed porcelain cover.

The company claims the porcelain clad types have advantages over the iron box or metal case types as the porcelain will not rust nor corrode, is an excellent insulator, is non-resilient, hence muffles the hum or buzz inherent in alternating current devices, and as applied to their transformer is pleasing in appearance, light in weight and mechanically rugged.



This transformer is made to produce pressures of the correct values where long and short bell circuits require different electric pressures

The cores on both the residence and heavy duty sizes are made of silicon steel, the coils are thoroughly impregnated and the cases are compound filled, which makes the transformers weatherproof, hence not injured by being installed in a damp basement or other places where they may be exposed to moisture.

WIRELESS RECEIVING SET

The Halcun Radio Co., San Francisco, is putting out a specialty in the way of a complete wireless receiving set with a range of about 200 miles. This set is absolutely self contained, having every necessary feature as well as complete instructions.

It makes an ideal gift for a youngster of about fourteen or fifteen. The retail price is only fifteen dollars.

ELECTRICALLY-DRIVEN MACHINE FOR OPENING LETTERS

Opening mail at the rate of five hundred letters a minute, a mere fraction of the time occupied by the paper knife, a small electrically-driven machine is proving a highly effective builder of efficiency in business offices by saving money, time, labor and patience. With this machine, one person can open the mail in less time than five or more by the old method, and with greater safety and accuracy. Not only is confusion thereby reduced to a minimum, but responsibility is unquestionably centered.

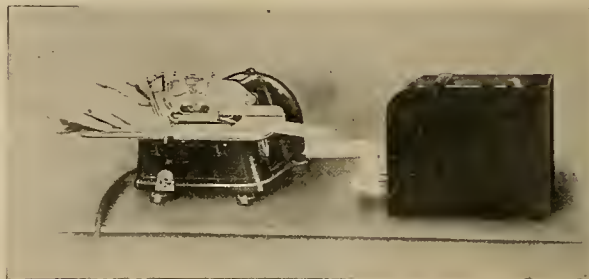
This machine built by the Bircher Company and known as the Lightning Letter-Opener, occupies but little space and can be placed on any table, desk or counter, all litter thereby being confined to a restricted area.

Attached to an ordinary lamp socket, it is set in motion, by a mere snap of a switch, through the medium of a Westinghouse motor mounted within the case and consuming an amount of power so small as to be almost negligible.

Mechanically, the machine is so simple of construction that not only are repairs reduced to a minimum, but any person of ordinary intelligence, after two or three minutes' practice, can operate it proficiently.

The envelopes are placed on the feed table in a stack of forty or fifty at a feeding, and are conveyed automatically

one at a time, by a feed belt, through two rapidly revolving circular knives which cut a very small shaving from the exposed edge of the envelope. The letters are then carried automatically into a stacker.



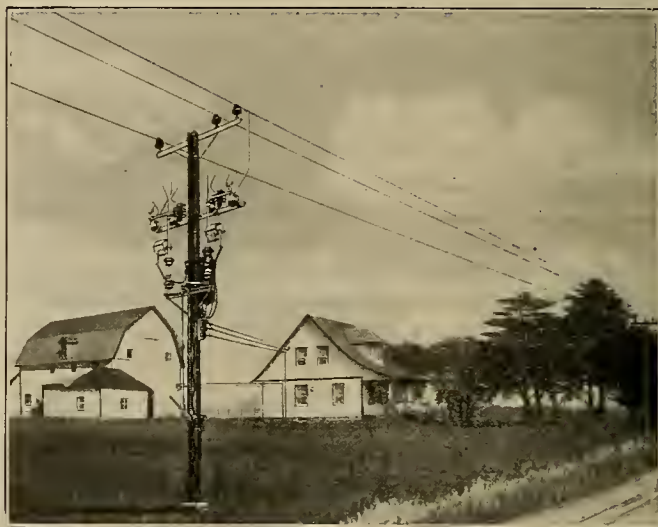
An electrically operated letter-opener which will handle mail at the rate of five hundred letters a minute

As the typewriter replaced the steel pen in the commercial world, so is the letter opening machine taking the place of the paper knife.

FARM POWER AND LIGHTING EQUIPMENT

Utility managers whose property is adjacent to rural communities have many opportunities for farm line service. The fact that farmers will invariably pay for the cost of lines makes this type of service attractive and the volume is increasing.

The Delta-Star Electric Company, Chicago, have developed a new type of equipment which incorporates the essential requirements of a complete switching, fusing, choke coil and lightning arrester element which can be installed at a reasonable cost.



The increased use of electricity in rural districts is leading to numerous developments for farm power supply. It is claimed that this installation is especially safe, simple, and inexpensive.

The two-pole switch is operated from ground level and the fuses so located that they can safely be replaced by the farmer and either steel or wood pole mounting can be used.

The claims made for this new equipment are safety, reliability, simplicity and a low installed cost.

A special article on arc-welding will be a feature of the next issue of the Journal of Electricity.

Books and Bulletins

Dealers' Helps

The Hotpoint Division of the Edison Electric Appliance Company has sent out a special window display for the Christmas season, also a well designed booklet on silver-plated tea and coffee sets and a general catalog. The Hotpoint window display cut-out consists of a center panel, 23 inches wide x 30 inches high, with a hinged wing side piece, 15 x 30 inches, on each side, size over all 53 x 30 inches. The center panel has an opening 12 x 15 inches providing a niche with a very substantial floor on which nearly any one of the Hotpoint appliances may be displayed.

An ordinary Mazda bulb may be inserted behind the display to cast a brilliant light upon the appliance displayed in the niche. This provides a very effective and attention compelling means of displaying the highly polished nickel appliances of the Hotpoint line.

The Hughes division of the same company issues a very useful 47-page booklet entitled "Hughes Electric Range Sales Service Manual," which gives a full discussion of the electric range from the merchandising point of view, with samples of publicity and very helpful suggestions for campaigns.

School of Electrical Engineering and Radio Telegraphy

The Department of Education of the Young Men's Christian Association, Portland, Oregon, has issued a bulletin giving general information and schedule of activities of its schools of electrical engineering and radio telegraphy in Portland. The purpose of the school is to provide a short cut to engineering practice, and to offer a thoroughly practical and complete course of engineering to the man who does not find it possible to spend the extra years and money required in the usual high school and college process.

The bulletin, which is very well arranged, gives an outline of all courses, with tuition fees entrance requirements, etc. Pictures and descriptions of the school buildings and laboratories are also included. The whole undertaking is an enterprising and practical one, which should be of great assistance to technical students.

University Publications.

The following publications from the College of Agriculture of the University of California have recently been issued by the University of California Press:

Cow-Testing Associations in California, by Edwin C. Voorhies; Pruning Young Deciduous Fruit Trees, by Warren P. Tufts; Plum Pollination, by A. H. Hendrickson; Seed Treatment for the Prevention of Cereal Smuts, by W. W. Mackie; Investigations With Milking Machines, by F. W. Woll; Mariout Barley, with a discussion of barley culture in California, by G. W. Hendry.

The Electrical Engineering Department of the Massachusetts Institute of Technology publishes a paper by Waldo V. Lyon on "Current Distribution in Armature Conductors," and one by A. E. Kennelly and Edy Velandier on "A Rectangular Component of Two-Dimensional Alternating-Current Potentiometer."

The University of Illinois Bulletin No. 110 is "Passenger Train Resistance," by Edward C. Schmidt and Harold H. Dunn.

The Throop College of Technology publishes a bulletin on "Scientific Education in a Democracy," a symposium held

at the meeting of the Pacific Division of the American Association for the Advancement of Science at Throop College of Technology.

Mining Machinery

The Allis-Chalmers Manufacturing Company of Milwaukee, Wis., publishes two well-designed booklets—one on a prospecting mill for free gold ores and another on stamp mills and accessory machinery for free-milling gold ores. The latter is extremely well illustrated and includes much valuable information. The same company also sends out a booklet on steam turbine blading, containing illustrations, charts, and inclusive data.

The Eight-Hour Day in the Home

"The Eight-Hour Day in the Home" is the title of a very attractive booklet issued by the Western Electric Company to present the labor-saving electrical devices which are being manufactured for use in the home. Each page has an artistic two-color photograph showing some electrical household appliance in actual use in the home, and underneath a brief discussion of the conveniences of that particular appliance. The whole effect is extremely pleasing, and the booklet is a very convincing piece of advertising.

New House Organ

The "Ermsco" News is the title of the new house organ of the Electric Railway & Manufacturers Supply Company, San Francisco.

In eighteen mimeographed sheets, it comprises a number of brief to-the-point news and trade notes, with personal mention and items in lighter vein. We wish the paper the best of success.

Radio Tests by Bureau of Standards

The Bureau of Standards has issued a list of radio publications and a statement of the work which the radio laboratory of this Bureau is equipped to do in the calibration and testing of radio instruments of various kinds. For such work a nominal fee is charged as stated in the test fee schedule. Arrangements are made for reduced fees to amateurs for the calibration of wavemeters. Electron tubes are among the items upon which the laboratory is equipped to make tests.

All articles submitted for test must be accompanied by a written request for the test. The request should enumerate the articles, giving the serial numbers or other identification marks of each, and should state explicitly the nature of the test desired. It is also desirable that the conditions under which the apparatus is used be stated.

In submitting radio apparatus, the accompanying letter requesting the test should state specifically the nature of the test desired, giving, in the case of wavemeters, condensers, etc., the number of points on the scale and the frequencies of wave lengths at which the apparatus is to be tested. In the absence of specific instructions, such tests will be performed as are necessary to determine the ordinary constants or operating behavior of the apparatus. Thus, for a wave-meter, variable condenser or inductor, the results obtained would make possible the use of the instrument as a secondary standard.

For special tests involving measurements not specified in the schedule, a charge will be made based upon the time required for the test. When the test is one regularly provided for in the schedule the fee may be computed in advance and should be sent at the time the apparatus is shipped.

The radio laboratory of the Bureau of Standards also issues a number of printed publications on radio subjects. In addition to these printed publications there are issued special laboratory reports covering the work recently completed on which no printed publication has been issued.

NEW ELECTRICAL DEVELOPMENT

(Bond issues for important city improvements and a number of new plant constructions are reported from the Northwest. Pacific Central district is going ahead with its extensive irrigation plans. Large engineering plans are under way in the Southwest, while the Inter-Mountain district is making a number of street railway and lighting improvements.—The Editor.)

THE PACIFIC NORTHWEST

TACOMA, WASH.—City council has ordered an ordinance prepared calling for ornamental lights on North D street.

NELSON, WASH.—This city is considering the matter of establishing its own utilities, particularly light and water.

PETERSBURG, ALASKA.—The city council has acquired a site for a \$75,000 hydro-electric power plant near that city and hopes to at once build a plant of 6000-hp. capacity.

SEATTLE, WASH.—Board of Public Works awarded contract to Roth, Mills & Company, 1933 First Avenue South, for 8250 feet of cable 13-16 inch for James street car line at \$2338.87.

SEATTLE, WASH.—Contract for furnishing three 6000-kva. transformers at \$24,750 for use at Cedar Falls extension of the city light plant has been awarded to Allis-Chalmers Manufacturing Company.

ROSEBURG, ORE.—The proposal of bonds in the sum of \$500,000 for constructing a municipal light and water plant will probably be up for decision at the coming special election.

VANCOUVER, WASH.—Petitions have been circulated in the business district asking that a new system of lighting be inaugurated, cluster lights to be installed on both Main and Washington streets.

PORTLAND, ORE.—All the technical employees if the city of Portland will receive an increase in salary in the near future, as the special election increasing taxes two mills carried by a good majority on the 10th.

SEATTLE, WASH.—The Rainier Electric Company, 118 Spring street, Seattle, is doing the complete electrical wiring in the plant of the Columbia Grafanola Company in the Maritime building, contract amounting to about \$4000.

PORTLAND, ORE.—The new quarters of the Pacific International Livestock Show at North Portland will be opened for the first time on the 17th, the arena being the largest in the world, it being erected at a cost of \$250,000.00, raised by popular subscription.

CHEHALIS, WASH.—It is estimated that the proposed new street lighting system for the business center here to be of steel or concrete standard with single globe and 400 watt lamp enclosed will cost \$1.25 a front foot. Extensions will also probably be made to Main street and Chehalis avenue.

CENTRALIA, WASH.—Surveying the ground and laying out the site preparatory to the erection of the steam plant of the Sherman County Light & Power Company is under way, same to cost when completely installed about \$160,000. Machinery which was formerly intended for a steam plant at Lewiston, Idaho, is on hand.

EVERETT, WASH.—Complete electrification of the Eclipse lumber mill at Everett, Washington, and construction of additional finishing facilities that will double the output of the same are contemplated in improvements now under way. Cost of the building expansion exclusive of machinery, totals \$26,000. With the completion of the new building and production started in it, it is proposed to electrify the remainder of the mill equipment now in operation under steam power.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company is taking steps preparatory to carrying on a campaign with other concerns to induce the people of Seattle to install porch lights where they do not have

them and to burn them all night, showing them how small the cost of the current would be in proportion to the benefits derived if enough people could be induced to join the movement. It is thought possible that the city light department may be induced to join the movement and make an effort toward inducing its patrons to keep their porch lights burning.

SEATTLE, WASH.—Charles C. Moore & Company, L. C. Smith building, Seattle, are building a new turbine plant for the Bloedel-Donovan Lumber Company at Bellingham. There will be a reinforced concrete building, one 2,000 and one 1000-kw. turbine. They have taken a contract to sell three 600-hp. Stirling boilers to the West Lynn plant of the Crown-Willamette Paper Company at West Lynn, Oregon, and to install two of the same sized boilers for the plant at Ocean Falls, B. C., also two 600-hp. boilers for the E. K. Wood Lumber Company at Bellingham, Washington. They are to install for the Union Meat Company at Portland a 500-hp. Babcock & Wilcox boiler and two 500-hp. Babcock & Wilcox boilers for the Granby Consolidated Mining & Smelting Company at Granby, B. C.

SEATTLE, WASH.—NePage, McKenny Company, electrical engineers, contractors and manufacturers, with offices in the Armour building, Seattle, and at Portland, San Francisco and Oakland, report business very active. They are installing complete electrical equipment for lights and power in the Mallory apartments, at 47th street and 14th avenue, Northeast Seattle, and installing complete electrical equipment in the new store building of John Graham at Second avenue and Pine street, Seattle. They have practically completed installation of the electrical equipment at the schools in Bremerton and Charleston, Washington, and in the Togo hotel at Bremerton. They are installing complete electrical equipment in the infirmary building and addition to the female ward, Northern State Hospital at Sedro Wooley, Washington, and have practically completed work in the new high school at Hamilton, Washington. They are now installing stage lighting, border lights, foot lights, strip lights, announcement letters and dimmers in the Liberty theater at Wenatchee, Washington. In their shops at Seattle they are making up the electrical stage equipment for Pantages theater in Los Angeles, Pantages theater in Salt Lake City and the Mercy theater at Yakima, Washington, also consisting of panel boards, switch boards, announcement letters and dimmers. Panel boards, switch boards and cabinets are being made for the White River Lumber Company at Enumclaw, Washington.

THE PACIFIC CENTRAL DISTRICT

HAYFORK, CAL.—Farmers of Hayfork valley have subscribed \$1000 to a fund for employing a surveyor to make a preliminary survey for the proposed Hayfork irrigation district.

VALLEJO, CAL.—Public works officers and employees at Mare Island are working on plans for the proposed \$1,000,000 wireless plant to be erected near the officers' quarters the coming year.

RICHMOND, CAL.—A building permit has been issued to the Great Western Power Company for a concrete sub-station at the corner of Pullman Avenue and Cutting Boulevard, to cost \$4,100.

MODESTO, CAL.—J. Soukas was awarded the contract for enlarging and lining the Modesto Irrigation District's main canal from Mill Gulch fill to the secondary gate, a distance of nearly a mile, at \$49,200.

BAKERSFIELD, CAL.—Sealed bids will be received up till Dec. 1st for the franchise to maintain, operate and construct a system of gas pipes, pipe lines and appliances for carrying gas for lighting, heating, industrial and other purposes.

SAN FRANCISCO, CAL.—The Independent Wireless Telegraph Company, Incorporated, with headquarters in New York, has established division headquarters at 110 Market street, with service stations at Seattle, Portland, Los Angeles and Honolulu.

SONORA, CAL.—The trial of the Yosemite Power Company versus City of San Francisco came to a close, the jury awarding the power company \$8,800 as a settlement for 80 acres of property involved in the Hetch Hetchy project belonging to the Yosemite Power Company.

LINDSAY, CAL.—The assessments levied by the board of directors of the Lindsay-Strathmore Irrigation District for the year 1919 are now due. The first installment of one-half the assessment will become delinquent on December 29, 1919, and the last payment is delinquent June 28, 1920.

MODESTO, CAL.—Permits have been issued to the Modesto Gas Company for the construction of \$74,450 worth of new improvements, as follows: Gas building, \$2,000; gas holder, \$27,000; boiler and accessories, \$7,760; gas generator, \$9,000; purification apparatus, \$6,000; accessory equipment, \$1,700, and water plant \$1,000.

ALTA VISTA, CAL.—The new owners of the Cheney ranch are building a dam which will be the largest in this part of the country. It is located four miles from the big Panoche. It is reported that the contract has been let for the hauling of two hundred and fifty tons of coal which will be used to run the steam shovels used in the excavations.

OAKDALE, CAL.—Data for the Melones dam site has been prepared for submission to the state engineer and bond commission in accordance with the requirements of the law, and request has been sent in for additional information to the Oakdale Irrigation District. The district is also seeking to get a line on the power possibilities of the Melones site and hopes to develop some power there.

SAN FRANCISCO, CAL.—Application has been filed by H. L. Shannon, San Francisco, for 200 cubic feet per second from Deer Creek in Tehama county, tributary of Sacramento River, for power purposes. Diversion works consist of a concrete dam 6 feet high, 100 feet long on top and 75 feet long at bottom; and a ditch and flume 10 miles long. The total amount of power to be developed is 22,700 t.h.p., and the estimated cost, \$500,000.

CHICO, CAL.—Application has been filed by Dennis Murphy, Chico, for 6,000 miner's inches from Deer Creek, Tehama county, tributary of Sacramento River, for power purposes. The water is to be diverted by means of a concrete dam 30 feet high, 60 feet long on top, and 30 feet long at bottom, and a canal, flume and tunnel 12 miles long. The total amount of power to be developed is 13,400 t.h.p., and the estimated cost is \$1,000,000.

FALL RIVER MILLS, CAL.—Twenty-six land owners living east of Glenburn, in the eastern part of Shasta county, have petitioned the Supervisors to establish the Fall River Irrigation District to embrace their holdings, aggregating nearly 9,000 acres. It is proposed to irrigate the land with water pumped from Fall River, a never-failing stream, by electrical power. The lift will be a short one and the cost of electric power small compared to the great advantage to be derived. The petition will be considered by the Supervisors December 3.

MACDOEL, CAL.—At a meeting of land owners held here preliminary steps were taken toward organizing an irrigation district to be known as the Butte Valley Irrigation District. A petition bearing at least 110 signatures will soon be presented to the County Supervisors requesting permission to organize. According to the surveys and estimates made by engineers in the state an adequate supply of water can be impounded for the successful irrigation of at least 10,000 acres of valley land which without water is generally admitted to be of little or no value.

SAN FRANCISCO, CAL.—J. B. Olcess and F. N. Rector, Merced, Cal., have filed an application for 700 cubic feet per second from Merced River, Mariposa county, for development of power for manufacturing, pumping, transportation and lighting. Diversion works consist of concrete dam 15 feet high, about 300 feet long on top and about 100 long on bottom, and pipe line about six miles long. The amount of water to be stored is about 150,000 acre feet. The storage dam to be of concrete, about 150 feet high, about 700 feet long on top and about 150 feet long on bottom. The estimated cost is \$200,000 for power house, \$500,000 for power line and \$500,000 for dam.

MADERA, CAL.—The petition for the proposed Madera Irrigation District was filed with the Board of Supervisors. Protests were filed by Miller & Lux, G. W. Mordecai and by the San Joaquin Agricultural Company (J. W. Goodwin). The board will set a date at some future time to hear the protestants. It is tentatively agreed, should the board deny the protests and approve the district plan, that an election will be called early in February. The proposed district will include something like 300,000 acres, and water will be secured from impounding some 600,000 acre feet at Friant, and 60,000 from the Chowchilla and Fresno rivers, and an additional 150,000 by pumping.

OKDALE, CAL.—The immediate construction of the Spicer Meadows storage project, to cost two and a half million dollars, jointly by the Hobart estate and allied interests, with the Oakland Irrigation District and the South San Joaquin Irrigation District, was urged by the capitalists interested at a meeting held with the irrigation directors. The proposal as outlined was for the construction of a reservoir at Spicer Meadows at cost estimated at \$2,500,000, of which the interests named and the irrigation district would each pay one-half. The proposed dam would store 60,000-acre feet of water and the company would be able to develop between thirty and forty thousand hp. The power interests agreed that they would permit 40,000 acre feet to be turned loose during the months of July, August and September, although they could use but one-half this amount for power purposes. The remaining 20,000 acre feet would be held in reserve for the latter months of the year. The company now owns 9000-acre feet of storage and plans to develop 6000 additional, from which the districts would benefit. They also made a tentative agreement not to sell water for agricultural purposes, other than to the two districts.

THE PACIFIC SOUTHWEST

LOS ANGELES, Cal.—The Ventura Home Telephone & Telegraph Company has petitioned for dissolution.

SAN DIEGO, CAL.—The city council has

passed an emergency ordinance providing for \$12,000 to be used for the construction of the Barrett Dam.

KINGMAN, ARIZ.—The San Carlos Dam will be erected to a height of at least 260 ft. above the bed of the Gila River. \$250,000 will be appropriated for reclamation projects.

LOS ANGELES, CAL.—A reservoir for Westgate's \$700,000 water system to be built in Stone Canyon will be started soon. A construction camp has already been created in the canyon.

NOGALES, ARIZ.—The matter will be taken up with the Douglas Traction & Light Company for the establishment of a car line to Agua Prieta. Aid will be given by the State of Sonora, if same will be built.

VENTURA, CAL.—The United Concrete Pipe Company has been awarded the contract for the construction of an irrigation system for the Berylwood Investment Company on their ranch near Somis. The cost is about \$20,000.

LOS ANGELES, CAL.—Application has been made for a 21-year franchise to install and operate a double track street railway on New Broadway between 10th and Pico streets, by the City Railway Company of Los Angeles.

EL CENTRO, CAL.—The estimated cost for the All-American Canal—from Laguna Dam to Imperial Valley entirely on American soil—will be \$3,333,545. The report has been signed by Dr. Elwood Mead, C. E. Grunsky, and W. W. Schlect.

WINSLOW, ARIZ.—The Winslow, Arizona, electric light and ice property will be taken over from the Santa Fe Railway January 1, 1920, by a company being formed by Mr. W. C. Quebedeaux. A complete electrical supply store is being made ready to open on that date.

LOS ANGELES, CAL.—A dam is to be constructed in Whitewater River wash near Palm Springs. The valley storm water board has let the contract to a Pomona contractor for the construction at \$15,865. It is to be completed by Jan. 1st. A similar dam will also be constructed in the arroyo east of Thermal.

TOMBSTONE, ARIZ.—W. R. Elliott, engineer and superintendent of the Salt River Valley Water Users' Association has been retained by the farmers who are pushing the Charleston Dam irrigation project. He has been looking over sites with the idea of laying out canals, etc., for a system of irrigation ditches.

SANTA FE, N. M.—Preliminary notice has been filed in the office of the state engineer by Mayor Grayson, that he intends to apply for all the unappropriated water in the Gila River above Redrock. Engineers are preparing a report. The project will provide for all unappropriated water; about 2400 acres will be irrigated.

LOS ANGELES, CAL.—Application has been made to divert water from Temecula Creek for the purpose of irrigation and furnishing water for domestic purposes for 15,000 acres in Riverside county, by Margaret Vail, N. R. Vail, Mary E. Vail and Mahon Vail of Los Angeles, and William Banning of Sonorita, Ariz., operating as Vail & Co. Diversion works will consist of pipe and open canal and dam 115 ft. high, dam to be of rubble, concrete and cyclopean masonry. The estimated cost is \$200,000.

SANTA FE, N. M.—Application has been filed in the office of the state engineer, on the reservoir site on Pecos River in Eddy county, about five miles north of the Texas state line, by O. C. Thorpe of Fort Worth, Texas. Maps, plans of dam, conduits, etc., are filed on a reservoir site near Red Bluff. Total cost of project, \$600,000. The project is for power development only, and the water to be used for power purposes will be turned back into the Pecos at the Texas state line. The project therefore admits of no use of the water for irrigation in New Mexico.

THE INTER-MOUNTAIN DISTRICT

OGDEN, UTAH.—It is the intention of the Ogden, Logan & Idaho Railroad Company to separate the operation of its interurban lines from the city street car lines. Probable operating economies are the reason for their action.

SALT LAKE CITY, UTAH.—Application has been filed by the Whitmore Oxygen Company of this city for thirty second feet of water to be taken from Little Cottonwood creek. The company plans to provide lighting facilities for the town of Wasatch.

BOISE, IDA.—A movement is on foot by farmers of the Minidoka project to construct an additional power plant for pumping purposes. The power will be generated from either the American Falls or Lake Walcott, and the plan is favored by the irrigation districts of both Rupert and Burley.

RUPERT, IDAHO.—At a special meeting of the city council recently, the mayor was authorized to sell \$60,000 worth of bonds voted early in the present year, to take over the electric plant. A complete inventory of the property is being made jointly by city and company officials, to determine upon a fair price for the property.

SALT LAKE CITY, UTAH.—This city is receiving considerable complimentary advertising from the appearance of a recent article in the Saturday Evening Post by Floyd W. Parsons, entitled "Affairs and Illumination." A photograph of Salt Lake City's "White Way" lighting system is used by the author as an example of high class illumination.

HYRUM, UTAH.—City officials have been converted to the idea that all electric service should be on a metered or measured basis. Recently it was necessary to shut down the municipal plant, and as the city is now purchasing current from the power company on a wholesale metered basis, they are taking steps to meter all service to the various customers.

Beginning with the issue of
January first

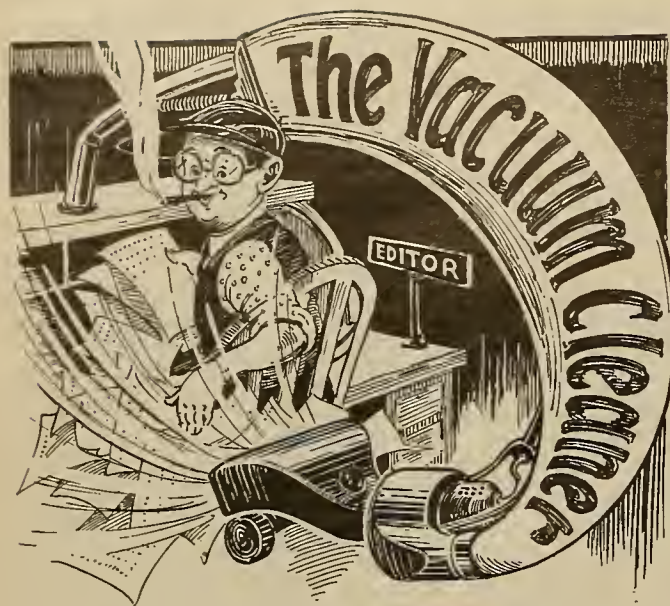
Office Records— Their Filing and Indexing

by IRENE WARREN,

Director of the Chicago School of
Filing and Indexing

A series of twelve articles which will meet the office needs of your organization, large or small. Miss Warren covers such subjects as equipment, filing systems, the use of the files, card records and the handling of special situations.

Let a Specialist Solve your
problems



Living in this day and age may be beyond your means, but if you are contemplating suicide as a way of escape, read this:

THE HIGH COST OF—

When a bachelor wight, I took little delight
In days that were loveless and lone,
The world I would comb to establish a home,
With a cute little wife of my own.
But when it was done, and the tradesmen, each one
The prices and rents began shoving,
My wedded bliss seemed hardly all I had dreamed—
And I learned of the high cost of loving.

Up, up in the sky, as the little birds fly,
The rates upon rations went soaring,
And if one should beg for a measly egg
The price set one's pocketbook roaring.
The prices on bread—I hope I may be dead,
If they didn't go raving and roving,
While the baker would sigh, with a cynical eye—
"Can't be helped! It's the high cost of loafing!"

And the laundryman's boy filled my life with annoy,
And rifled my pockets of dollars
Each time he would count up the growing amount,
He assessed me for wrecking my collars;
And the water bill, too, took the general cue,
'Till I cut down my bathing and shaving,
For I found there's no end to the general trend—
And I wept o'er the high coast of laving.

They first blamed the war, then the armistice for
The price, and my heart began seething
With fear, bye and bye, lest they try to get by
With a charge upon hearing and breathing.
And the revenue laws some will cite as a cause,
Or politics blandly they're giving
As reasons of weight for the terrible state
That is known as the High Cost of Living.

I have tackled the game 'till I say, without shame,
I am conquered and utterly broken;
I am tamed, I am licked, my last kick has been kicked,
And my last word of protest is spoken.
I would flee, with loud cheers, from this dim vale of tears,
And would leave all the profiteers grieving—
But alas, I am cowed! I've been pricing a shroud—
And I can't stand the high cost of leaving.

DEAN COLLINS.

* * *

A discriminating mule who seems to have read the statistics on "better lighting and industrial efficiency" is the hero of a story told in connection with Edison mule lamps. Hauling a train of coal cars in a mine is risky. Walking in the dark, a mule may stumble and break a leg, or be run over by a coal car, or anything.

At the request of a certain mine manager, the mule lamp was tried on a certain mule with great success. Next day when his driver went on the job the mule balked on pulling the load. No reason; just refused to move. No amount of persuasion or profanity would start the animal.

The driver in despair had about given up the job and was on the verge of building a fire under him when a bright idea came to mind. Hot footing it to the shanty he secured the lamp used in the previous day's experiment, and attached it to the mule. Off went "Jazboo" like a streak! It wasn't long after, at the decision of the mine manager, that every four-legged animal in the mine had a lamp of his own.

* * *

"New lamps for old" was a good selling slogan in the case of Aladdin's wife, but "sweepers for cows," though slightly more startling worked exceedingly well with a certain Texas housewife.

While canvassing his territory in a special effort to sell suction sweepers, a salesman called on a prominent woman. The latter liked the sweeper, but felt that she could not afford \$57.50 at that particular time, because of a Liberty Bond payment being due. In the course of the conversation she intimated that she would possibly be interested in trading her milch cow for the sweeper. The salesman promptly walked out to inspect the cow, and after doing so informed the prospective customer that he would deliver the sweeper in about an hour. Later he drove up to the company's office in his auto with a nice Jersey cow trailing behind at the other end of a rope. In less than an hour later he had sold the cow for \$57.50.

* * *

Half a minute in the complaint department of a central station:

Ding-a-ling-a-ling!!!!

"Hello. You say that your cat got in the fan and it won't start again. Well, look into the fan again and see if you extracted all the cat—good bye."

The ringing of half a dozen 'phones at once.

"——!?! \$\$\$?! X=!!!!"

Then, after lifting one of the hooks:

"Complaint department, madam. Your lights won't burn? Have you tried pressing the wall switch? . . . Then try the snap on the plug socket. Good bye."

"Hello. What? No, this is not the Humane Society—complaint department for the —— Light and Power Co. That's all right, good bye."

"Hello. Yes, this is Sarah. Not now. I'm busier than the Old Boy himself, but I will see you after work. Be a good boy—(smack)."

"Complaint department. What? You will have to see the Police about that. We have nothing to do about that." And so forth. This would be considered a slack period.

EMERSON EASTERLING.



Have you ever tried to talk into seven telephones at once and look pleasant?

JOURNAL OF ELECTRICITY

VOL. 43 NO. 12

SAN FRANCISCO, DECEMBER 15, 1919

PER COPY, 25 CENTS

THE SPIRIT of COOPERATION

EMULATION of nature is the best illustration of "The Spirit of Cooperation."

Man sows the seed: it rains; the sun shines; the earth gives up her blessings which mankind harvests.

No man attains success, or even progress, except by the aid of his fellow man. There is no such thing as an individual succeeding solely by his own efforts.

The power company plows the ground and sows the seeds of success for the entire industry. The manufacturer, wholesale distributor, contractor and dealer promote a spirit of fertile good-will; and the public reaps the harvest.

The electrical field is destined to develop and grow in the minds of the people only in such proportion as is fostered by each branch of the industry.



SAN FRANCISCO
OAKLAND
SEATTLE

PACIFIC STATES ELECTRIC CO.

LOS ANGELES
PORTLAND
SPOKANE



More "Kind Words" for Birney Safety Cars

THE frequent and quick service rendered by Birney Safety Cars won the public's favor from the beginning. This valuable asset has resulted in "more riders" and a substantial increase in net revenue. Giving the public the kind of transportation it wants will naturally sell a greater volume of this transportation.

The President of one railway company, which has had these cars in operation for the past year, wrote: "I have heard more kind words regarding the good street car service and the pleasure of the public in it than I ever expected to hear in a lifetime." This is but one of the railway executives enthusiastic over the success of Birney Safety Cars on their lines.

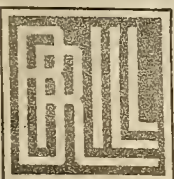


Over 125 railways are enjoying the profitable results of Birney Safety Car service operating in cities large and small and under all conditions.

THE J. G. BRILL COMPANY

Philadelphia, Pa.

AMERICAN CAR CO., St. Louis, Mo.
G. C. KUHLMAN CAR CO., Cleveland, Ohio.
WASON MANFG. CO., Springfield, Mass.



JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

VOLUME 43

SAN FRANCISCO, DECEMBER 15, 1919

NUMBER 12

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Vice-President & Editor

ARTHUR H. HALLORAN
Secretary



A BROAD POLICY of PUBLICITY has always characterized the electric industry of the West, where the use of electricity has become so intimate a factor in the prosperity of the country. Under the new stimulus of cooperative advertising, which has now been generally adopted, six thousand pages of advertising have appeared in six months in the columns of Cali-

fornia newspapers alone. The papers here represented were among the first to take up the idea of special electrical pages, but others are already following suit, even in the same communities, and the result in popular interest is already being felt. The center display here shown is a four page spread in red and black which recently appeared in the Los

Angeles Examiner as an advertisement of the service which "Prudence Penny," whose column answers questions on household economies, is rendering in the field of electrical appliances. The other pages from the Bakersfield Californian and the San Francisco Bulletin are typical of the electrical advertising features which are now appearing in newspapers throughout the state.



JOURNAL OF ELECTRICITY



DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST
AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43

SAN FRANCISCO, DECEMBER 15, 1919

Number 12

(Copyright 1919, by Technical Publishing Company)

PUBLICITY—the light of directed attention! Like sunlight itself, the bright rays of Publicity cause that which they shine upon to prosper and grow. A mighty civilizing power, vitally related to the worldwide interchange of commodities, making known to all humankind the new inventions and developments of man's genius, Publicity has assumed a truly essential place throughout modern life. In America it has reached its highest attainment; and largely through the energy created by proper publicity of our just aims in the war against Autocracy, our nation was welded together as a unit, and our Victory was made certain through the Liberty Loan drives—constituting unquestionably the greatest advertising campaigns in history. Seeing the beneficent effects of this powerful agency, our national government continued its efforts even after the war, and recently through the Secretary of Labor carried on a nationwide newspaper campaign urging all merchants and manufacturers to advertise now without stint, so that trade may return to its accustomed channels and prosperity may be assured. With such high authority as its sponsor, Publicity has gained an eminence of usefulness that cannot be assailed. There is no industry that will not profit immensely through its influence. There is no part of the electrical industry, above all, that may justly say, "Advertising cannot help us, for we do not come into direct contact with the public." Every element of our great industry stands in a very real relation to the people which it serves; its wellbeing depends upon a widespread public attitude of interest and esteem. The public must be educated to a full utilization of modern electrical devices now developed and yet to be developed. The people's confidence must be gained, so that the extensions of power projects and upbuilding of manufactories may be generously financed. Contractors and wholesalers, in the ultimate analysis, are as much affected by the public attitude as any elements of electrical enterprise, and they are recognizing their responsibilities by cooperating in concerted advertising campaigns now being waged. Never before has the electrical industry been so awake to the value of proper advertising. The West, with characteristic energy, is leading the way, and in this issue of the Journal of Electricity are set forth some of its recent achievements in this broad field of Publicity.

An interesting experiment has been started in California in the establishment of electrical pages in newspapers throughout the state under the encouragement of the Publicity Committee of the Pacific Coast Section, N. E. L. A., and the California Electrical Cooperative Campaign. The direct effect of this massed advertising on the reading public is of the utmost importance, but perhaps an even more wide-reaching achievement is the education of the newspapers to the importance of the electrical industry in the welfare of their respective communities. The newspapers today are most of them ignorant of the importance of an industry which on the whole has not advertised and which has been little understood except by experts.

The different attitude which is already being assumed by the papers carrying these one to four-page spreads of advertising is to be seen in the length of reading notices given by the various papers to electrical events which are called to their attention. Without any derogatory insinuation, it is a fact that the newspaper which has had the idea of an electrical page or electrical section sold to it is much more receptive to such news items and more likely to write them up as events of importance.

In this connection it must be remembered that in a great many cases where small advertisements are run by dealers, the newspaper service department and the newspaper compositor are the ones who are

responsible for the wording and setup of the advertisement. Up to recently, many newspaper men never came in contact with any electrical literature in the entire course of their lives. One of the large manufacturers has instructed all salesmen to include the local newspaper office in the round of their calls, after learning that the newspaper officials of some of these towns had never before met any men of electrical interests, either from their own community or elsewhere. These local newspapers have also been placed upon the mailing list of the manufacturer for similar literature to that sent to dealers, with the idea that if the newspaper is to write the advertisement, it should at least be familiar with good samples of electrical advertising art.

With all its shortcomings, the American newspaper wields a powerful influence upon public opinion. The present campaign has the virtue, not merely of arousing the interest of the public, but of arousing the interest of the newspapers and gaining an ally where lay the possibility at least of a neutral adversary.

Much disappointment has been expressed at the failure of the Senate to pass the water power bill during its last session. It has been slated for early considering at the session just opened, however. The railroad question is to receive first consideration and then it is promised

**National
Engineering
Legislation**

that the water power bill will be taken up. The Senate bill contains several important changes from the text of the bill passed by the House, chiefly in the limiting of charges which may be made for rental, but it is expected these will be accepted by the House without question. The national engineering societies and individual engineers throughout the country have been giving the bill good support and it is expected that when the problems of Mexico and the peace treaty can be left long enough to consider national needs, the bill will be passed and returned to the House for concurrence in the changes.

The "Jones-Reavis" bill to create a national department of Public Works it has been thought desirable to leave in the background until the campaign is further advanced, and at the request of the Engineers'-Architects' conference on this subject, it has been allowed to remain in committee without action.

A budget of \$633,000,000 for national highways is reported by the Bureau of Public Roads for 1920, fully four times the amount spent in 1919, which is just one of the tremendous engineering enterprises scheduled for the coming year. The unquestioned importance of the national issues at stake have provided an excuse for the delay in engineering legislation, but the country has a right now to expect the prompt consideration of its pressing needs.

The comparison is often made by the public between the financing of public and privately owned utilities. Annual reports are printed in the papers and when it appears that a publicly owned utility has shown a profit for the year under rates no larger than those which a privately owned concern may at the time be asking to have raised, it becomes difficult to comprehend that the need for a greater income on the part of the power company or the street railway may be a legitimate one. The difficulty is due, of course, to the fact that the publicly owned utility may fail to reckon the item of taxes, which expense is thus passed on to the taxpayers as a whole, or may make inadequate provision for depreciation and replacement; may, in fact, in a dozen ways alter its accounting system from that in use by private companies to make a better showing. There is no implication of dishonest or unfair intent in this, but the disadvantage to the privately owned concern is obvious.

It is obvious that strict supervision by the utility-regulating bodies of the various states on the whole has been a good thing. One of the advantages of this regulation has been the necessity of a clear showing of costs and expenditures by all companies on the same basis. Why should not this requirement be extended to the publicly owned utility? It is of value to the citizens of a community to know just where they stand in respect to their water or power system, judging it from the same standpoint that a privately owned utility is judged; it would be of value to the regulating body itself to

have this comparative data at hand. From the point of view of the privately owned company, it is a mere matter of justice.

The only way this desirable end may be brought about is to secure the passage of legislation in the various states giving rate regulating bodies the power to demand a uniform system of accounting from all utilities, whether privately or publicly owned. The matter is one which should be followed up by the electrical industry as among those most to be benefited by the measure.

"Country-to-country converse is soon to be nothing unusual. As the result of the development of the telephone repeater and other technical advances, people in San Francisco or Portland will be able to talk over the telephone to Buenos Aires with utmost ease." These were the predictions of Major Volney D. Cousins, Equipment Specialist of the Pacific Telephone and Telegraph Company, in a recent address before the San Francisco Electrical Development League. Half-smilingly, Major Cousins suggested that in the near future the long-distance telephone central must be proficient in Esperanto.

The astounding progress in means of communication which this generation has achieved, and which appears likely to be steadily carried onward, makes well worth while the consideration of anything which better "world understanding." Long-distance telephone, radio, airplane—these have made truer than ever the time-honored saying that the world is a small place, after all. Nations are all neighbors now; and there apparently must be some common neighborhood currency of speech. The numerous proponents of Esperanto have put forward their "scientific language" as a solution for this very real need, and there has been so far no better suggestion. They urge it not as a substitute for the national languages—English, French, Spanish—but simply as an auxiliary medium of thought-exchange, which is deemed just as essential as commodity-exchange in the world life of today.

Great activity has been manifested by the Esperantists in this first year after the war, and their cause has unquestionably gained much ground among elements not before strong in their ranks. Many practical business men have become thoroughly interested in the Common Commercial Language Committee. This organization, with headquarters in New York City, is equipped to transact world business on a large scale through the medium of Esperanto; among its services is the preparation, publication and distribution of catalogs in this "common commercial language." Technical specialists and scientists, too, have of late been looking closely into Esperanto, seeking to find its serviceability in diffusing ideas with necessary exactness and accuracy. In Europe, especially, the technical vocabulary of Esperanto is being systematically expanded.

The Journal of Electricity considers itself fortunate in being able to present a brief yet comprehensive "Grammar of Esperanto," beginning in this

Standardizing Accounting Systems

Esperanto and World Communication

issue. This work, from the pen of Judge W. R. Daingerfield of San Francisco, will serve to indicate the essential nature of the auxiliary language, and should give our readers a more intimate insight into a movement which has as its aim the creation of better and more free communication of thought amongst all peoples.

With great gratification the Journal of Electricity records the selection of David Prescott Barrows as the new President of the University of California. In these editorial columns a month ago Dr. Barrows was termed "the man of the hour for the presidency of the University," and this editorial support was widely quoted and endorsed in the press of the State. That our judgment has been so completely confirmed by the Board of Regents is satisfying indeed.

It has already been pointed out how important for the electrical industry of the West it is to have men of true vision to bestow strong and sound leadership in the coming years of progress. Dr. Barrows stands eminent in all the qualities of leadership, as it has been our privilege to show, and now that his entrance upon this high office is assured, the electrical industry of California, together with all other progressive communities of interest within the State, congratulate him heartily upon his appointment. Knowing fully the latent resources of the great West, he is sympathetic with engineering research and development that shall bring increased wealth and wellbeing to the land. The institution whose destinies he is called to direct is now in all likelihood the largest of all universities. It demands the leadership of such a man as he, one with the world-viewpoint gained after years of intensive study of the world and its problems.

All honor then to David Prescott Barrows, "a ripe scholar, an able executive, student of nations and men, soldier, traveler, and, above all, a genuine American."

The woman has been accused of the department store habit. She is credited with purchasing silverware, millinery, groceries and pianos from the same establishment—and the only reason she has not included automobiles and electric kitchen ranges is because the store has hitherto not carried them in stock. But the average department store is now beginning to carry the electric range and is already featuring washing machines and vacuum cleaners in advertising and store display. It is a tribute to the service rendered by the electrical contractor-dealer, therefore, that of

about sixty women present at a recent women's club meeting where electrical merchandising was discussed, only one testified that she purchased her electrical ware at a department store. Most of the women present explained that they dealt with an electrical specialist just as they would go to a milliner for their hats, because he knew the technical side of the wares he was handling. They did not feel sure that the girl at the department store knew whether she was selling them a good article or not—and they had found that department stores often carried electrical goods which they had never heard of before and they liked to get important things of that kind from a well known manufacturer. The one woman who favored the department store did so because she could charge any articles purchased there without question. She admitted that time payments were almost as satisfactory, but was not sure that a dealer would grant them on just one purchase.

There are several morals to this frank expression of opinion, but perhaps the chief of them is the value of the publicity which has put the electrical dealer on the map and given him his honored position in the mind of the woman customer.

The importance of cleanliness and neatness in all departments of power company activity has been pointed out by S. M. Kennedy more than once in his suggestions for the establishing of good will between the company and the public. The impression acquired from the slovenly condition of substation back yards or of automobiles bearing the company's name may be unconscious, but it has its effect in the general estimate formed of the public utility as a citizen of the community it serves.

An example of the bettering of a reputation through consistent courtesy and cleanliness is to be seen in the case of the Standard Oil Company. Although dealing in a commodity far from attractive in itself, Standard Oil trucks always look as though they had been newly painted, and it has been said that they may always be counted upon to keep to their own side of the road. The automobile service stations which dot all large cities are always immaculate, and surrounded by the greenest of well trimmed plots of grass. Every man has an interest in the appearance of his community, and cannot help but be favorably impressed by a concern which is so obviously a good citizen. When power company buildings come to be looked upon as show places in their respective communities, the power company's reputation is just so much the safer in the public mind.

IN THE NEXT ISSUE: A New Year in the Electrical Industry

Power Stock Preferred—An Advertising Campaign

BY ROY L. SHURTLEFF

(The psychology of advertising, though much discussed, has not yet become an exact science. For this reason there is more than a passing interest attached to the following account of a successful campaign for the sale of stock which is today held by more California investors than any other issue, with the single exception of Liberty Bonds. The author is a member of the firm of Blyth, Witter & Co. of San Francisco.—The Editor.)

When the firm of Blyth, Witter & Co. purchased from the Pacific Gas & Electric Company \$5,000,000 First Preferred Stock, and undertook to sell it without the aid of associates, it realized that it was attacking a rather difficult problem. The problem was not alone the size of the issue—although a \$5,000,000 block is rather an unusual amount to be handled by one distributing organization—but \$25,000,000 of the stock had already been sold, and largely to the class of buyers with whom the firm was in touch. It was believed that as far as regular purchasers of securities in its territories were concerned, a point of supersaturation had very nearly been reached.

Working Out Plans

Nevertheless, Blyth, Witter & Co. went ahead without aid. Our theory was that since the last block of Pacific Gas and Electric stock had been sold, an entirely new field of investors had been developed through the general transition and redistribution of wealth which had taken place in the country in the last four years. We knew that most of this new wealth was in the hands of people who had never purchased securities other than Liberty Bonds, and felt that the medium to get them to become purchasers of securities in general was such an issue as Pacific Gas & Electric preferred stock, because the company is so well and favorably known not only in California but throughout the country.

Our means of reaching these new investors were twofold:

First, through our regular sales force, which was augmented to work intensively in the various counties in which our offices operate; and

Second, through an advertising campaign.

In attacking the advertising and the sale of this stock, we had to keep this point before us: that we are essentially, and above all else, a conservative financial investment banking house, and all advertising of such institutions of which we had knowledge had been along lines which impressed conservatism upon the reading public, but at the same time had little sales value. We had to keep another fact always before us: that we had \$5,000,000 of stock to sell, which would have to be disposed of largely through advertising, and that our advertising must therefore have real selling force. We therefore had to follow a campaign which was conservative, dignified, and yet possessed "human interest" enough to appeal to people who were not financiers.

The advertising campaign was divided into three parts, covering the newspapers, the street-cars, and national magazines. The first and last have always been acknowledged mediums for finan-

cial advertising. In the second, we started into new fields. Some of our advisers told us that nobody having money to invest longer rode in street-cars, but we went forward on the contrary theory that not everybody who has \$1,000 buys an automobile, and that some of the American people still prefer to lay aside something for a rainy day, and ride on street-cars.

Preliminary Advertising

Our first advertisements in the newspapers were the regular, conventional announcements—run on the financial page. Then we started out to create "atmosphere." Our first cards in the street-cars did not try to sell the stock, but told how good it was. Here is an example:

"In the past thirteen years the Pacific Gas & Electric Company has re-invested \$34,465,353 of its earnings, which is equivalent to 70% of the Company's surplus earnings during this period.

6388 investors consider Pacific Gas & Electric Company 6% Preferred Stock a proper investment for their savings. Why shouldn't you?"

For the first month our effort was not to pull the money out of the pockets of our readers, but to instill in their minds the safety of Pacific Gas and Electric stock. Our newspaper ads were therefore statistical, and spoke of the size, substantiality, and scope of the company. Our newspaper advertisements were run largely in the general news section, rather than on the financial page. Street-car ads intended to carry out the same thought were also used during the second stage.

The third stage of the campaign started at the end of the first six weeks. It was now the endeavor to create desire and action. We had sought to lay a foundation as to the safety of the Pacific Gas and Electric stock, and now endeavored to fashion this reputation into actual purchase. An advertisement showing a bank check and headed "Here is a Check for You" is illustrative.

Working for Psychological Effects

We then deliberately stopped Pacific Gas and Electric advertising for a time, and substituted therefor advertising of a general nature, offering other securities of the highest integrity, handled by this house. It was felt that this was necessary because, with such a long-drawn-out campaign as we were working on, the investing public, not realizing the size of the issue and the purpose of the campaign, might gain the impression that the stock was a slow mover.

The last stage of the publicity drive took up once more the Pacific Gas and Electric securities and directed the attention of the public to the attractive rate of income. Up to this time our advertising had been devoted to the attractiveness of the issue, the stability of the company, and the general desirability of the stock as an investment. Having laid this basis for action, it was thought advisable to concentrate on the matter of attractive income.

In addition to the usual financial circular, advertising the issue, this firm has just published a twenty-page illustrated booklet on the properties of the Pacific Gas and Electric Company. This contains charts, diagrams, facts and figures calculated to inspire the investor with a desire to possess a block of this stock, which displays such a large factor of safety.

Factors of Success

Now as to the success of handling the sale of this stock in this manner: Inasmuch as the campaign is not yet completed, results cannot be definitely stated. However, we laid down for ourselves a fixed program of progress, and at this writing we are somewhat ahead of it. In the number of new security buyers we have gained, the results have exceeded what we had in mind. We have learned four definite lessons:

First, that financial advertising, in order to hold the interest of the public, must constantly attack from new angles.

Second, that the number of people who will write in, in answer to specific ads, is small; or, rather, that the amount of bonds so purchased is small. The results come from the general impression created. We found that a very small percentage of the people who bought did so as the result of any one ad.

Third, that the advertisement that seemed to bring the best response was the one which told how many other people had bought. It seemed to inspire confidence to know that more California investors owned Pacific Gas and Electric preferred stock than held any other issue except Liberty Bonds.

Fourth, that in the planning of a financial campaign sales effort is a necessary adjunct to the advertising.

Three-fourths of our sales have been made as a direct result from the call by a salesman. Probably only a fraction of these sales would have been made without advertising; but, also, only a fraction of them would have been closed without the work of the salesman.

In spite of statements to the effect that no one who has money to invest rides in a street car, Blyth, Witter & Co. made extensive use of street car cards of this kind to convey to the public interesting general information about the securities being sold.

ENGINEERS OF YESTERDAY—18. GALVANI

(Series Compiled by A. L. Jordan)

If frogs' legs can be made to kick upon touching them with certain metals, does it prove that there is "animal electricity" in the body?



Luigi Galvani (1737-1789) became public lecturer in anatomy in the University of Bologna, Italy, in 1762. A few years later he began experiments with electricity upon the muscles of frogs and made known in 1786 that two different metals, one touching the frog's nerve and the other a muscle, produced a "kick."

His supposition that electricity came from the frog was disproved by Volta (considered in the next of this series of articles), but the "frog experiment" made him famous and his name is perpetuated in the words "galvanic," "galvanize" and "galvanometer."

Publicity and the Power Company

BY I. W. ALEXANDER

(The development of any district is dependent upon the capacity of its power companies. In the following article the two vital needs of the power company—finances and publicity—are discussed with the conclusion that the ultimate responsibility lies with the press. The author is a member of the San Joaquin Light and Power Corporation.—The Editor.)

The press of the West should work just as earnestly and enthusiastically for the sale and safety of power company securities as it did for the Liberty Bond issues. This may seem at first glance a bold and selfish statement, but it is fact nevertheless. Only the sale of power company bonds and stock can fittingly increase the development of this great West. If central stations are not permitted to earn a fair return on invested capital, if power company securities do not sell, and if the latent hydro-electric power of the West is not developed sufficiently to meet the growing demand for it, there is just one answer—the progress and prosperity of the country and its inhabitants will be retarded in proportion directly as the power companies' ability to finance and earn is restricted.

With one exception, truthful publicity is the most vital need of the power companies of the West. This exception is money for the development of additional hydroelectric generating capacity. Were it possible to obtain the necessary publicity the money would soon be available, once the people had the true understanding. Inasmuch as no rich relative is going to die and surprise the utilities with a big inheritance, the deduction that proper publicity is the most important question before the power companies today, is entirely permissible.

Leaders in electrical development and electrical thought have long realized that failure to put their cause before the people is working an unjust hardship upon their companies, but they are powerless to correct the condition. Advertising offers one ray of hope which unfortunately cannot be taken advantage of because of the serious inroads made upon the earnings of power companies during the war years, due to the large increase in operating costs without wholly compensative increase in income. Furthermore, there is an economic reason why advertising paid for with funds subscribed by the central station companies, should not be depended upon for this tremendously important work.

Mr. A. Emory Wishon, president of the Pacific Coast Section, National Electric Light Association, in an address delivered before the Electrical Development League in San Francisco, September 22nd, stated:

"The greatest problem that faces us today is that of having the public understand what the electrical industry is doing for the nation, but in our opinion this understanding can only be brought about by proving to the individual of this public what the electrical industry is doing for him—what further developments of the electrical industry mean to him in dollars and cents gain and what a delay in electrical developments, due to legislation or other causes, means in dollars and cents loss to his individual business.

"We who have studied the problems of the development of the West, know that the West will not develop ahead of its hydroelectric development. The greater part of the Western territory depends upon hydroelectric pumping for irrigation of its arid lands, if agriculture is to be further extended. If factories are to be located West, cheap power must be

obtainable. Any form of legislation, national or state, that delays electrical development, delays the development and prosperity of the West and any thinking electrical man can sit down and figure out just where any particular business loses in dollars and cents when hydroelectric development ceases. Prove your case to the individual by proving where the individual's pocketbook is hurt, when your business is hurt, and you will have a convert who will see that your business is allowed to prosper."

Mr. Wishon stated a generally known fact when he said the greater part of the Western territory depends upon hydroelectric development for irrigation of its arid lands, if agriculture is to be further extended. Therefore, we will bring the example of an agricultural community to the attention of the editor, because there is hardly a newspaper in the West that does not depend upon the support of agriculturists and agricultural communities for its success.

The town of _____ is situated in a San Joaquin Valley county in the center of a rapidly growing and flourishing farming community. During the past few years there has been an influx of home-seekers owing to excellent farming lands selling at very attractive prices. Business has been growing because the newcomers have increased the purchasing capacity of the community. The demands increased upon the merchant, the lumber man, the laundry man, the newspaper, the banker, the hotelman, the phonograph dealer, the pump dealer and all others including, finally but not least, the power company. As the merchant ran out of shoes and clothing he could place orders and increase his stock at will, even though the exigencies of the time compelled him to pay more for his wares. He merely increased his selling price to cover his increased cost and the percentage of profit he deemed necessary to do business on. So with every other line of business—except the power company. As the newcomers established their homes and pumping plants, the available power was quickly depleted and it was an impossibility to put any more on the shelves, so to speak. The only way an additional stock, to take care of more new customers, could be obtained was to build another generating plant or else buy the output of an already established generating plant.

The first of these solutions was impossible, due to war time restrictions and difficulties of financing due to increased costs of operation from war-time prices. To illustrate, permission first had to be gained from the Railroad Commission to advance rates to compensate for loss of earnings. The power companies cannot arbitrarily raise their prices. Secondly, the increase of fifteen per cent in power rates during the war-time period is greatly less than the increase in prices of all other essential commodities which range from 40 to 240 per cent.

The second solution was equally impossible because all the other power companies were confronted

with the same problem. Therefore, the power company remained "sold out" and there was a famine in power. The result was that settlement ceased. When homeseekers could not get power to develop their properties, they decided to postpone their activity until such time as the power was available. In the meantime they have voluntarily come to the office of the power company and made application to buy the power when the company can serve them. At the present time there are more than 120 applications on file in this one office of the power company, and before the ensuing irrigation season has arrived it is a safe prediction that this list will have increased to 200—every one voluntary and without solicitation of any kind.

Now let's see what this means. The records of this company show that for every family that moves into an agricultural community two move into a city. In other words, the increase in population throughout its territory has been two to one in favor of the cities, which means that two new settlers in a city are required to support one new settler on a farm. Therefore, because the power company is physically unable to provide power for the two hundred new pumping plants clamoring to be installed in this particular locality, the city population is being deprived of the addition of four hundred new families.

Two hundred new homes in the farming districts! Pumps and motors, lumber and cement, overalls and shoes, harness and automobiles, groceries and millinery, everything that the human being utilizes.

How about those four hundred new families waiting to be included in the city population? They, too, have to have houses, and shoes and meat and banks and newspapers and moving picture shows and candy and ice cream and what not!

But the business interests of this locality will not participate in the increase until the power company is enabled to develop the power that will permit the installation of those 200 new pumping plants in the farming district and the establishment of those 200 new homes. When this is done, the city population will enjoy its increase. But not until then.

Therefore, think a few moments longer and answer this question: Who is the heaviest loser, the business community or the power company? Why, the business man, of course, and by manifold. Hence, it is very evident that it is to the best interest of the merchants in any locality to encourage in every way possible the development of the agricultural community surrounding it; and furthermore, when public opinion is so influenced that it restricts the development of a power company, the people themselves are the greatest sufferers.

So in putting the responsibility for the development and prosperity of the country squarely upon the shoulders of the newspaper editor, it is where it rightfully belongs. The editor, who honestly desires to be a constructive element, wield an influence for good, and perform a service to the people and community he serves will not evade it. If his community prospers, his business prospers to a like extent

To the editor in the community above referred to, the addition of six hundred new families will mean a great number of new subscribers, an additional demand upon his advertising columns from local and national advertisers, and best of all the satisfaction gained from having performed a real service by being a factor in community building and an actual contributor to the prosperity and welfare of his public.

It is to be expected, should the press come to the assistance of the power companies, the "howl" will be made by "single-track-thinking" individuals that the press has "sold out"—that is, has been "subsidized by the greedy corporations." A mere statement of fact will expose the fallacy of such a supposition and further justify this action of the press as the only course it can pursue if it is to deal fairly with the power companies and public alike.

The people have placed the complete regulation of all utilities—power, water, gas and transportation—in the hands of a Railroad Commission. This Commission is composed of several members appointed by the Governor, who in turn, has been elected by popular vote of the people. In exercising far reaching jurisdiction over the affairs of these utilities, the Commission approves all rates charged for utility service. Before approved, however, all rates are subjected to most exhaustive investigation by Commission experts. The utilities cannot issue stocks or bonds without the sanction of the Commission. Every dollar received from the sale of all securities must be accounted for, to the satisfaction of the Commission. In the event of protests, public hearings are held at which the contentions of the public and utilities are equally weighed. What better guarantee of a square deal is possible?

All fair-minded people recognize that invested capital must be permitted to earn a fair return, otherwise money for public improvements would not be available. Therefore, it is equally the duty of regulating commissions to maintain a fair earning for the utilities, as well as to obtain rates that are absolutely fair to the consumer. Inasmuch as the utilities are the very lifeblood of any community, no fair thinking man will consent to a popular opinion or agitation that will impair their proper functioning or jeopardizing their stability.

The newspaper honestly endeavoring to promote the best interests of its readers, its advertisers and the community it serves can best accomplish this purpose by becoming an enthusiast for additional hydroelectrical development and the champion of the principle that public utilities are entitled to and should receive a fair rate of earning on the capital invested. The utilities do not care what the rates are just so they return a fair rate of earning. If a low rate will make the necessary earning, the utility is better satisfied because this condition is more pleasing to the public. However, should a high rate be necessary for earning, the people should as freely grant it, and it is reasonable to believe they would were they to know that in so doing they would be only meting out justice and fair play, and furthering their individual interests.

Congenial Contacts

BY S. M. KENNEDY

(The letter, the telephone conversation and the personal interview—these three are the mediums through which the public utility comes in contact with its customers. The general agent of the Southern California Edison Company here discusses the way in which these should be handled in order to eliminate friction and establish friendly relationships between company and consumer.—The Editor.)

There is a Moslem maxim which runs as follows—"Four things come not back: The spoken word, the sped arrow, the past life and the neglected opportunity." This maxim is a good one for the employe of a public utility corporation to think over now and then, if he has an earnest desire to serve his company and incidentally advance his own in-



Letter writing is an art which may be freely used to please customers and strengthen a business. The writing of letters plays a vital part in establishing harmonious relations.

terests. There is no greater asset a utility corporation can possess than the confidence of its customers and the good will of the general public, and there is no means whereby a corporation is measured or judged more constantly or more accurately than by "the spoken word" as used by the corporation's officers and employes. This is neither an old adage nor a new theory, but an incontrovertible fact, substantiated by the experience of those who have made a close study of the subject usually termed "Public Relations." Today the manager with progressive ideas values the confidence of the people to a greater extent than he does a franchise; for in a hostile community a franchise is of little value, either as an asset or a means of protection. Consequently the best efforts of all officers and employes connected with a utility company should be put forth to please the people—so that every word and act will carry a suggestion or conviction that corporation men are really human—that they desire to serve the public conscientiously and honestly, and that if mistakes are made and errors are discovered, they will be speedily and willingly rectified. Now, there are three principal ways or angles by means of which the public reaches its conclusions about a utility company, and these may be termed the "points of contact." The first point is letter writing, the second is the telephone and the third is the personal contact. If one were asked, "Which of these points is the most important?" a reply might be given by asking "Which is the most important leg of a three-

legged stool?" All points of contact must be carefully protected, otherwise the object to be attained will be postponed or entirely defeated. If two legs of a stool are strong and the other weak, then all are weak. If two of the points of contact in a utility company's organization are fulfilling their functions, and the other is not working harmoniously, then the harm being done in one direction is probably counteracting the good work done in other ways. The different points of contact will first be considered separately, and then as a whole.

Letter Writing

If there is any kind of work that requires thoughtful consideration on the part of a business man it is that of writing letters. It was Bacon who said, "Reading maketh a full man, talking maketh a ready man and writing maketh an exact man." However, exactness is not the only consideration in a letter emanating from the office of a utility company. In order to produce the desired effect it must be couched in language which will also convey consideration and courtesy. The writing of letters is of vital importance in connection with the relations of the larger companies with their consumers. It is of more importance to larger companies only because a greater amount of business is transacted by means of letters in the company that numbers its consumers by tens of thousands, than in the company that counts its customers by hundreds. One of the penalties of a company becoming large is that because of a greater and more extensive territory served, patrons cannot always find it convenient to make personal calls and tell of their wants or wishes. Many complaints are forwarded in letters; many inquiries are received and requests made through the mail. A letter in itself is only cold type, dry ink and thin paper. The gesture, the facial expression, the twinkle of the eye and the nod of the head are all absent. Just the naked words are there to do the talking; consequently one must be more than careful in the selection and use of the words that are written. After what has been dictated has been forgotten by the sender, the letter remains in the other fellow's possession, and he may take it up now and again to look at and ponder over it. If it contained anything that hurt when received, it probably hurts more each time it is re-read, and it is more than likely the reader will eventually work himself up to a point of explosion. A hot letter sent in reply to a caustic communication received is poor business. The answering epistle may be cleverly constructed, really smart, and burn with righteous indignation—but what good does it do the company? If the customer who writes a letter has some grievance, real or imaginary, he had better

be conciliated by receiving a reply with full information, if possible, regarding all the circumstances surrounding the alleged cause for complaint. It is bad policy to word a letter, even if the facts seem to justify, that will make a consumer feel humiliated, because he has made an erroneous statement or an unwarranted charge. There is nothing gained by such a method—and on the other hand—more trouble is invited. It is easy for an employe with a candid opinion to eliminate many friends for the company with which he is connected. Requests for



The telephone is the door through which most of the company's patrons enter, and is likely to become the most important as far as number of consumers handled is concerned.

service are frequently received by letter. It is always easy to please if requests are granted upon application—but when they cannot be conceded, or can only be granted under certain restricted conditions, carefully worded letters are essential when replies are sent. Some people have an idea that every public utility company should supply service upon demand. Whenever possible such people should be talked to personally by an employe with a tactful tongue and a patient disposition. But if a letter is to be sent informing the writer that service must be refused, then it should contain a careful and considerate explanation, stating clearly and concisely all the facts, with the thought in mind that the letter so written may not only have to satisfy the customer, but that it also may be passed upon by the Public Utility Commission if the customer should forward it to that body.

Letter writing may be considered a valuable aid in business building, and here again the form or style either wins what is wanted or loses out. Letters are a dignified and desirable means of drawing the attention of selected people to any subject of special interest, and are always productive of good results. Such letters should have the personal touch, and should be neat and attractive in style and diction, carefully avoiding any resemblance to a communication which might be considered general in its character. Letters sent to customers should contain few technical expressions and no abbreviations. Most people are now familiar with kilowatt hours, but few know about K.W.H.'s or K.V.A.'s. The customer wants light or power, not explanations re-

garding voltage and amperes. Letter writing is an art which may be freely used to please consumers and strengthen a business—but an ill-worded or discourteous letter is much more dangerous than the same number of words when recklessly spoken.

The Telephone

The manager of an electric company who is at all observing, fully realizes how much of the company's business is handled over the telephone and with what rapidity the number of telephone calls increases. This point of contact bids fair to become one day the most important of all in so far as numbers of consumers handled is concerned. Perhaps even today, the telephone is the door through which most of the company's patrons enter to transact their business. It is not difficult to realize how essential it is to keep this door well oiled and well attended. It should be remembered that there are always three parties to a telephone call:

- (1) The person calling
- (2) The telephone company
- (3) The person called

That one or two of these parties do their work properly is not sufficient. Concentration is the watchword of efficiency on the telephone and the co-operation of all three is necessary. It may be assumed that the telephone company does its part perfectly, that its service is sufficient and its operators attentive. For the present, therefore, we will consider only the person calling and the person called, and their relation the one to the other.

Employees of a central station company should have clear and frequent instructions how to talk over a telephone, not only from the business standpoint, but also from the standpoint of mechanical necessity. Again it is affirmed—concentration is essential. No successful conversation was ever conducted by one who tried to telephone and at the same time add a column of figures or talk to a third person. In order to avoid the annoyance of shouting or having to repeat, one should speak directly and distinctly into the transmitter, with the lips close to the mouthpiece. This may seem a point that everyone understands—but such is not the case. It is not uncommon to see a man talking in a direction quite opposite to the location of the transmitter. If the other party hears, it is a miracle. It is also necessary to speak slowly. Half the art of good telephoning lies in deliberate talking. This means clearness and emphasis. In telephone usage, the tone and manner of speech, and the choice of words has everything to do with the feeling created. The spoken word and the inflection conveys whatever idea each party gets of the other. The impression made is entirely by what one says and the way he says it, and here is where the element of courtesy steps in and oils the machinery. But to be really courteous in telephone usage involves more than pleasant tones. When the average man meets the people in whom he is interested, or even casual acquaintances, maybe even those who are strangers, his manner is gracious and his bearing such as to gain and retain friendship and good-will. This same consideration of others should not be forgotten in

telephoning. It is well to assume that the man at the other end of the line is a friend, and that he is entitled to treatment entirely free from harsh tones and abrupt language, such as would not be used in personal contact. A telephone manner may become a valuable asset or an embarrassing liability.

In a large organization there is often great difficulty and much delay in reaching the party wanted. This trouble may be minimized by the adoption of proper methods. The telephone operators in large corporations should be quick to understand what individual or what department is wanted when calls come in. The words "One moment, please," will help things while switching and ringing the individual required. If possible, one switch from the private central is all there should be, but if it is necessary to switch from one operator to another, and then to a third party, no time should be lost in making the connection. The operators of a private exchange should be able to interpret incoming calls, so that mistakes in getting the wrong party may be avoided. Nothing will more quickly wear out a customer who may be trying to do business with a company than to hold a telephone receiver to his ear and have to wait while he is being switched from one office to another, and required to tell his story over again each time he talks to a different party. A telephone call for any person in the office is equivalent to leaving a calling card, and is entitled to a polite response. If the person called is out, the operator should inquire if anyone else will do. If no one else will do, the operator should then say, "Mr. Blank is out, but if you will leave your name and number, he will be pleased to call you immediately on his return."

In answering telephone calls, the operator should use the company's name, the name of the department, or the telephone number, as best fits the situation. "Hello" is not a good word to use, nor is any other expression which does not convey information to the calling party, so that he is in position to proceed without delay. "What is it, please?" although courteous, does not meet the situation as the use of any such indefinite phrase leads to needless questioning and delay. In a large organization, it is particularly needful that each employee should be shown the way he is expected to answer the telephone, and someone should see that the instructions are consistently followed. Telephone calls should be answered promptly. A telephone call neglected means delay for the calling party and perhaps the loss of a call. As far as possible the office boy should be relieved of the work of getting calls for his chief—the party calling should always be ready to talk when the party called answers. It is painful all 'round to have someone "hold the wire" unnecessarily while someone else is attending to other work. Sometimes upon the manner in which what may seem to be a casual call is answered may depend the obtaining of an important piece of business. With a central station company there should always be an expert on the line that receives complaints and another on the line that handles inquiries for service. These lines are equally important and should be well guarded.

It has been assumed that the telephone service itself is perfect—but as is well known, such is not always the case, and poor telephone service may often be a handicap for the central station company to contend with. However, telephone employees can also be polite, and evidently none more so than those who handle the lines and switchboards in China. When a subscriber rings up the exchange in that country, the operator may be expected to ask: "What number does the honorable son of the moon and stars desire?" "Hohi, two-three." Silence. Then the exchange resumes: "Will the honorable person graciously forgive the inadequacy of the insignificant service, and permit the humble slave of the wire to inform him that the never-to-be-sufficiently-censured line is busy?" While this illustration may be a great exaggeration it is much pleasanter to hear than the opposite. It seems that for many in using the telephone it is especially easy to be gruff and abrupt and turn friends into enemies because, maybe, one thinks he is busy. An employee is never so busy that he cannot furnish the public with proper information, and should do so courteously even over the telephone.

Personal Contact

The points of personal contact in the central station company's organization are numerous and important. In the office there are many clerks, and on the outside—calling upon consumers at their places of business, or in their homes—are salesmen, collectors, meter-readers, troublemen and inspectors. And this is not all, for at times there are also linemen, construction men and service men. The work of these men is varied, but in some respects they should all act in the same way. Each should understand his own duties, and leave a good impression on the consumer after he has finished his particular business, so that the next man coming along and representing the same company, may find the consumer in a friendly frame of mind, because of the good treatment received at the hands of employees who preceded. Where all employees should be alike



It is now the community of interest idea that does the business. The manager with progressive ideas values the confidence of the public, and the old attitude of suspicion, based on the belief that the interests of customer and company were antagonistic, is being done away with.

is in seeing that the consumer receives the considerate, careful, attentive and courteous treatment to which he is entitled. If this is consistently accorded to the consumer, the clerk in the office will receive smiles when he is given an error to correct—the salesman will be handed a pat on the back when the customer bestows the order the salesman desires. The collector will be welcomed as a friendly visitor; the meter-reader will be asked to come oftener—and the troubleman and the inspector will be invited in for a cup of tea. As for the lineman, serviceman and construction boss—when these men are careful of the trees, shrubs, flowers and lawns when doing their work, and clean up the mess they usually make before they leave, they will receive commendation that will reach the ears of the president of the company. These conditions may be ideal, but they are not impossible. They may be termed visionary, but in reality they have been known to occur. Politeness is like an air cushion—there may be nothing in it, but it eases the jolts wonderfully. Consideration for and attention to the other fellow's requests may take a little effort, but if regularly practiced they will earn immense dividends. This is the easy way to handle the company's business. It follows the line of least resistance, yet always produces satisfactory returns. The day has long passed when there can exist any "Corporation versus The Public" attitude. It is now the community of interest idea that does the business. The modern public policy is

for the utility corporation to concede to its consumers and the public every request that is reasonable, and the result now is that the public in the main abstains from making unreasonable requests. The proper attitude at all points of personal contact can result only in improving the relations between the company and its consumers, and enhancing the value of its service.

It has been said that "Sometime in the future, a nation's civilization will be measured largely in terms of kilowatt-hours consumed per human being per year." If such is the case, then the aim should be steadily to increase the number of kilowatt-hours consumed. At each of the points of contact between the company and the public there are valuable opportunities for making friends and adding new consumers, thereby increasing the demand for the company's product. Each employe should regularly ask himself, "Am I making the most of the opportunities offered so that the public and my company may reap the full benefit?" If every employe would only do just a little more each day what would eventually be the outcome? It is just the additional little margin that wins, whether in time or in toil, in power or in energy, in attention or in earnestness. Just the additional little margin of effort at the points of contact, patiently and tactfully to inform the public concerning those things which they should rightfully know, will mean another step toward that goal all men with high ideals would reach—perfection.

Advertising a Retail Store

(The art of planning advertising which will really sell goods calls for extensive and intensive study of a number of factors. The following discussion of these points formed a part of an address delivered by Frank E. Fehlman before the Associated Advertising Clubs of the World.—The Editor.)

There are four simple things which will guide any retailer in improving his merchandising:

- 1—Know the merchandise.
- 2—Know the customer.
- 3—Know every medium in the town which can be used for advertising.
- 4—Understand the importance of short, terse, but very specific advertising copy. Of course, this is the hardest thing in this quartette of fundamentals.

The way to study merchandise is to start with a wholesaler or his salesman, who sells you your goods. Before he leaves town, he should be made to dictate a complete description of the merchandise you are buying, which can in turn be given to your salespeople on the arrival of the merchandise and discussed by them in detail.

A Variety of Needs —

The second essential is to know your customer. If you are advertising to millmen, railroad men, or farmers, talk service, wearing qualities, and the adaptability of your merchandise to the lives of these customers.

Selling a \$35-serge suit is entirely different from selling a fancy Paris tweed to a broker on Fifth Avenue, who will gladly pay \$125 to \$150 for a suit which will not wear one-third as long as the \$35 serge.

Unless you know your customers, you can't write advertising to reach them. Of course this means more time and more thought put on the advertising.

It means the dividing up of copy. If you are selling \$25 suits of clothes for the working man, forget the banker, the professional man, and direct your copy to these particular customers. It flatters them, even though they do not buy the next day.

Selecting a Medium —

In choosing advertising mediums, dealers in some towns use moving pictures and street cars and derive splendid returns from their investments. Others spend all their money on street cars. One merchant in Milwaukee built his business from street cars, and still uses them for his show advertising.

Other merchants have used bill boards, and spent over half their appropriation. The thing to do is to study your own local market—know your merchandise, know your customers, and then plan to use the mediums that will get you the quickest results at the lowest possible cost. Sometimes you have to experiment for two or three years before you can finally pick out the one thing which delivers

the greatest net returns for the least amount of money invested.

In general, we find that the newspapers are the backbone of any advertising campaign. There are certain positions in a newspaper which are better for you and it is up to you to find out where these positions are. In a small town (under 5000 or even up to 25,000) your advertising pulls better if it is on the page which carries local news. I know one dealer who pays a premium of fifty per cent for a certain position on the local page for a period of eight years. He has proved conclusively the value of this space. After you have picked out the various mediums you expect to use, apportion a certain amount for one year. If it is \$2000 stick to your \$2000. If you expect to have special propositions, lay aside \$200 for that purpose, but never exceed that amount. The mere fact that you have an arbitrary figure set the first of the year, makes you a better buyer of space, and more exacting in checking up your returns.

Not one merchant in 100 does this today, but more will do it in the next ten years. The national advertiser has been compelled to do this. Otherwise his advertising would have cut into his net profits to such an extent that his banker would question his ability to conduct the business.

Brevity in Advertising Copy —

After you have studied your medium, you are ready to prepare your copy. The psychologist has given us a great many things well worth considering in preparing copy. One of the first things is that an average person can read at a glance a line of three to seven words, containing not more than two syllables. Why go against this law of vision? Why string out a headline of 14, 15 or 16 words?

One thing to watch continuously is the way the newspapers handle their headlines in their big stories. Newspapers are compelled to tell the story of the world's events in headlines. Few people read the complete story. They read the headlines, and the subheadings, and pass on. Women will read from 150 to 200 words, while most men will not read more than 50 to 60.

Any of the big mail order houses offer splendid examples of terse, specific copy. Mail order houses depend upon pictures and words to sell merchandise.

Last year the largest house in this country sold more than \$160,000,000 of merchandise that way. Get one of their catalogs, and study the lines of merchandise that are similar to yours. See how they describe it. Then plan your advertising along the same general lines. Specialty shops which are selling style, prestige, Paris importations, etc., do things in a different way, but the average merchant depends upon headlines, clean cut illustrations, and short copy to sell his offerings.

The next ten years are going to see a great change in retail store copy. Syndicate service and special writers on newspapers have done a great deal, but the retailers themselves are at last alive to the importance of good copy and they are devoting

a certain amount of time to it themselves, employing special writers.

Working for Results —

Encourage your store employees to submit ideas for copy, and don't expect every advertisement to bring people in out of breath, money in their hands, anxious to get the merchandise you offered the day before. Advertising works slowly, but surely. It is planned and conceived in the idea of building up business.

Customers want news, but they want it told briefly and with an appreciation of their needs. Put more money into the brains preparing the copy, and your space will yield tremendous returns. It took the national advertisers a long time to learn this truth, but most of them now know it. Project yourself into your advertising. That is the kind of advertising people will read.

ESPERANTO AND THE ELECTRICAL INDUSTRY

(Translation from an article in "Esperanto" for October, 1919, p. 166.)

"The activity of our workers, which aims at the introduction of Esperanto in international commerce, already has produced satisfactory results. For nearly a year the World Salesman (Yokohama) has published an Esperanto section, and now, apparently as the result of that, we are informed that the Journal of Electricity (San Francisco) intends to devote four or five pages of its August number to our language. A few days ago the C. C. L. C. London received a very affable and interesting letter from Robert Sibley, the editor, together with a sample of the Journal. As an industrial or professional gazette it is a model of the best style of the printers' art; its hundred pages contain many beautifully drawn and striking advertisements of the most important firms in the United States; the technical notes and articles provide a true education to all those interested in electrical affairs.

"To all Esperantist electricians we cannot refrain from saying: 'Get it; borrow, steal or subscribe to it, but do not fail to possess it, especially when the Esperanto articles shall appear in it.' Electricians who desire further information may write to S. R. Marshall, Hon. Sec. C. C. L. C. (Cook's Office), Ludgate Circus, London, E. C. 4."

The above translation was made in Switzerland and transmitted to the Journal of Electricity by A. H. Babcock.

The original Esperanto version was published in the Journal of Electricity for August 15, simultaneously with the first article of the Esperanto series.

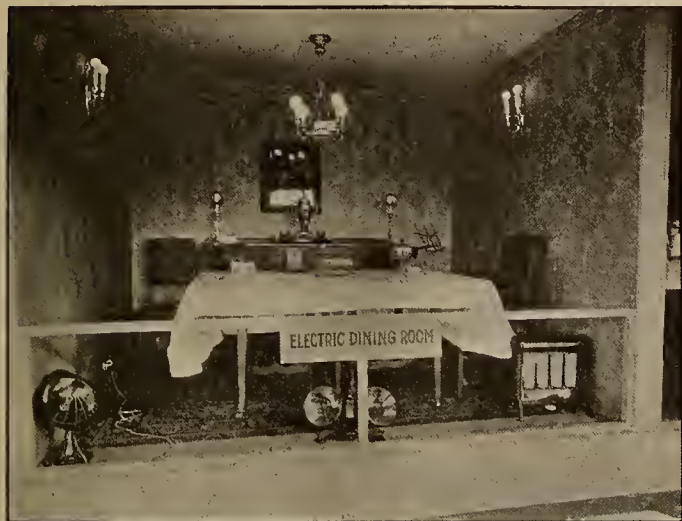
THE E. M. M. SERVICE

An unfortunate error found its way into our last issue where an account was given on page 510 of the Electric Motor Maintenance Service, the new double store of the Nutt Brothers at Lindsay, Cal. Instead of "Lindsay" the word "Willard" appeared, and the error was not detected until after the forms had gone to press. We offer our apologies.

Electricity at Utah State Fair

The fair and the parade are coming to be very widely used by electrical concerns for publicity purposes, and permit of extremely effective and convincing displays. The electrical home described below was a venture of this kind which aroused marked interest in electrical appliances.—The Editor.)

With the idea of bringing more forcibly to the minds of customers and prospective customers, the simplicity and convenience of various electrical devices, the Utah Power & Light Company's exhibit

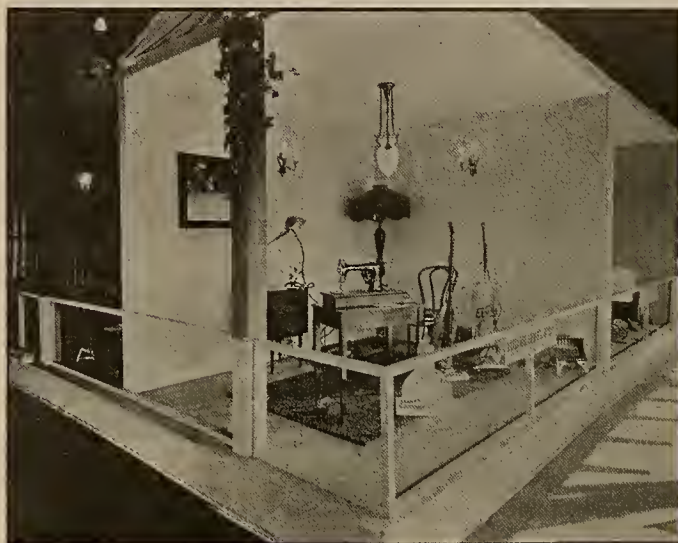


A dining room equipped with electrical cooking apparatus for preparing a meal on the table. Different kinds of electric heaters are also shown.

was arranged to portray the interior of a five-room house, showing the various types of equipment which can be used to advantage in each room of the home. This was accomplished by building a raised platform in the center of the company's building and finishing the rooms to represent a kitchen, dressing room, dining room, sewing room and laundry.

It is interesting to note the vast change in the attitude of the public toward electric cooking. While a very few years ago an electric range was consid-

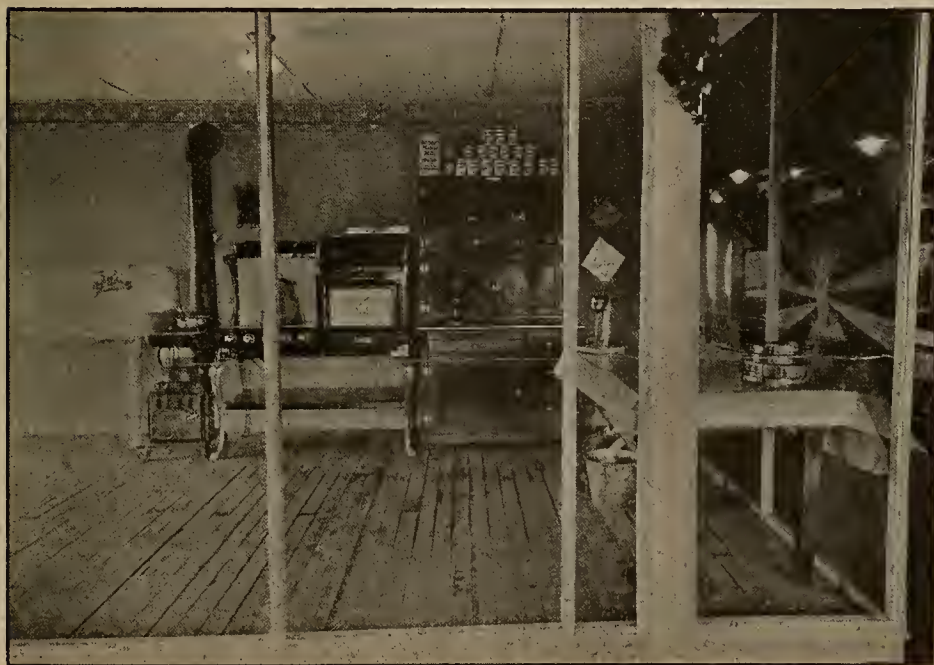
ered more or less of a novelty and experiment, it is not now necessary to explain to most people what an electric range will do, the main interest of the housewife being to find a range which will fit into her kitchen and meet her requirements as to appearance. The range, of course, was the principal point of interest in the kitchen, but the kitchen utility



The electrically equipped sewing room. Demonstrations were given here of the electric portable sewing machine and the vacuum cleaner.

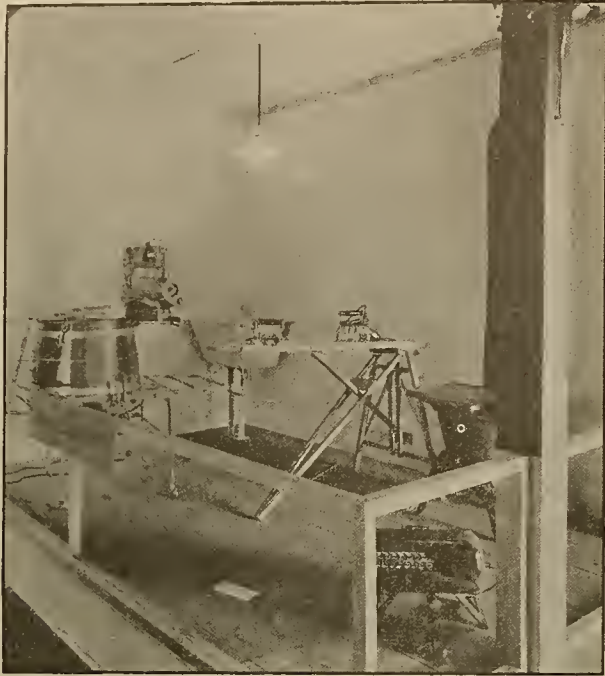
outfit, and various table appliances also attracted considerable attention.

In the dining room were shown the different kinds of table appliances which can be used for preparing a meal "on the table"; including a percolator urn set, chafing dish, waffle iron, toaster and grill stove.



The electric kitchen attracted a great deal of attention at the Utah State Fair. The cleanliness and efficiency of the electric range were brought home to many interested visitors, who also appreciated the smaller conveniences in the way of table appliances and a kitchen utility outfit.

The sewing room was of considerable interest because practical demonstrations were given showing the superiority of the electric portable type of machine. Vacuum cleaners were also demonstrated to advantage in this room.



The labor-saving laundry where washing, wringing and ironing are done electrically. An electric laundry stove and furnace regulator complete the equipment.

In the dressing room were displayed an electric curling iron and heater, boudoir iron, heating pad and boudoir lamp.

The laundry had a decided appeal to a large number of visitors, and salesmen were kept busy showing them how the unpleasant household tasks of washing and ironing can be accomplished electrically with very little effort in a short time. An electric washing machine, iron and board, laundry stove and electric furnace regulator were on display in this room.

Electric heaters were placed in each of the rooms and proved their worth in a practical way, judging by the crowds of people who "camped" in front of them during the cool days.

A jazz band was on duty to assist in bringing the people in the general direction of the company's building and proved itself a good "magnet."

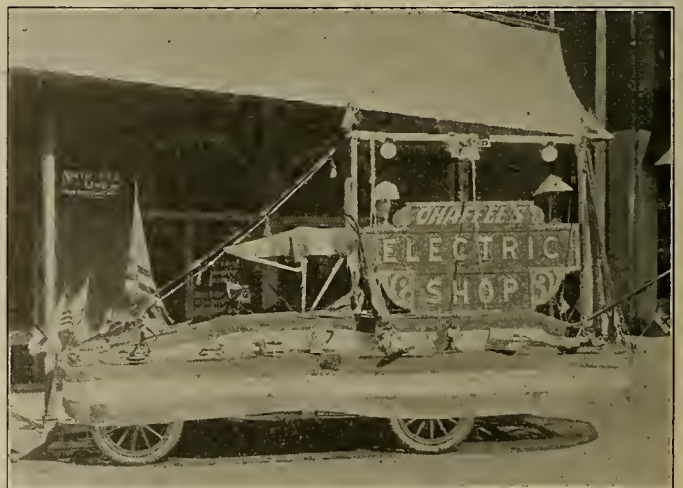
A special exhibit, in addition to the above, was set up showing the various practical ways in which electricity can be used on the farm for irrigating, domestic water pumping, feed grinding, etc., and a large number of very good prospects were secured from the farming districts served by the Utah Power & Light Company.



The booth of the Valley Electric Supply Company at the Fresno Fair. This extensive space was filled with a fine display of electrical household appliances of which washing machines were an important feature.



A good example of the effective electrical displays which are now a common sight at fairs is this attractive booth of Chaffee's Electric Shop, maintained at the recent Visalia Victory Fair. The sign is the same as that used over the store itself and the fact that it becomes familiar to all visitors to the fair is of great advantage to the store.



This float won a \$50.00 cash prize in the Fourth of July parade at Visalia, California. It is notable that the same sign is used as appears in the booth shown on the left.

Publicity Through Motion Pictures

(A publicity medium which has not been utilized to anything like its fullest capacity in spite of the large audience it offers, is the motion picture. Following is an account of some of the ventures of electrical companies in the field, and the machinery available for this type of publicity.—The Editor.)

Educational motion pictures are recognized by all as being one of the best means of putting a story before the general public. One of the leading electrical manufacturers has already taken advantage



A film prepared by the Society for Electrical Development to advertise the electrical home

of this opportunity to visualize for the public the progress and wonderful achievements being made in the electrical industry.

Each picture tells a complete story. For instance, one picture depicts the evolution of American navigation from the Indian dug-out, the sail boat, the treadmill-driven ferry, Robert Fulton's steam-driven "Clermont," etc., to the latest achievement—the electrically propelled U. S. superdreadnaughts. New pictures are being produced continually, each telling a vivid story of modern science and invention, and yet having interlinked a scenic or human touch to make it of interest to the general public.

This manufacturer maintains a Film Department in San Francisco for circulating the films on the Pacific Coast. The films are loaned free, except for transportation charges, to anyone requesting them. The theatres receive notice of each new production, and the very large number of requests received from theatre managers signifies in no uncertain way that they and their patrons find the films extremely interesting. Educational institutions also are anxious to exhibit the films because of their high educational value.

In order that the men of the electrical industry may know when one of these educational electrical films is to be shown in their town or city, notices giving the name of the theatre and when the exhibition will take place are sent to the electrical dealers and contractors, the central station men, and to others who might be interested.

At present there are 9 different pictures in circulation on the Pacific Coast. In order to meet the large demand for those most recently produced, several extra copies are required; therefore in reality there are 21 films in circulation in this district. To date this year these films have been

shown by 354 exhibitors 2000 times to approximately 367,000 people.

The popularity and demand for the films is steadily increasing with each new production, and there is no doubt but that these educational films



Announcements of educational films arranged by the General Electric Company

are playing an important part in promoting an interest in things electrical and making known to the general public the advantages of the use of electricity.

The statistics which have been given are of the work that is being done by but one of many electrical manufacturers. Adding to this the work



Scenes from moving pictures prepared by the Western Electric Company

that the other manufacturers and a few of the jobbers are doing along the same lines, one can well say that motion pictures are playing an important part in stimulating business in electrical appliances.

Obviously the manufacturers employing motion pictures must be getting some direct or indirect

returns from their expenditures. This, coupled together with the general value that such work is to the industry as a whole, commends it to the careful consideration of manufacturers that are not doing as much in this line, to say nothing of the consideration that should be given the matter by those who are doing absolutely nothing.


A Lamp Selling Contest

(Increasing sales, familiarizing the neighborhood with the name of the store, inducing a wider use of lamps, bringing in new customers—these and many other good results were obtained by the interesting plan described below. The idea is capable of various applications and may well be studied by the retailer.—The Editor.)

A successful piece of publicity work, recently carried out by the Levy Electric Company of San Francisco, was in the form of a lamp selling con-

test sent to his home. A list showing the standing of contestants was put into the window each week.

Bright orange colored hand bills were printed announcing the contest and giving the rules. These were distributed among the pupils of three large schools in the neighborhood during a recess period. The result was a host of children wishing to register for the contest, and almost every contestant brought



**INTELLIGENT
ELECTRIC
SERVICE**
PHONE PROSPECT 230

FREE PRIZES
GIVEN BY
LEVY ELECTRIC CO.

1230 POLK STREET **PHONE PROSPECT 230**

LAMP SALES CONTEST

RULES

1. Boys and girls under 18 years old may participate.
2. Contest begins September 22 and ends October 21, Edison Day.
3. Winners of grand prizes will be announced in windows and by mail to every participant.
4. Every participant achieving 1000 points (each Watt is a point) will be guaranteed a prize valued at least \$1.00.
5. Each lamp sold will be applied as points in grand total.
6. Each participant presenting a single order of 2000 Watts or more will be credited with a bonus of 25% additional points.
7. Prizes for 1st, 2nd and 3d week (ending Saturdays) will be a Flash Light valued \$2.00, for highest number of points each week.
8. Grand prize, for total highest number of points during contest, will be a Merchandise Order valued at \$15.00. About 50 prizes in all will be awarded.
9. All participants not having won a prize before the last week, and who at the close have 1000 points, will receive a Flash Light valued at \$1.00.
10. Prizes awarded weekly and at close of contest.

Register at 1230 Polk Street
Free Prizes for Boys and Girls

This leaflet, printed in black, on a bright orange ground, was distributed among school children to announce the contest, and brought in throngs of contestants.

test for boys and girls between the ages of 10 and 18 years. The contest lasted one month and the prizes offered were as follows:


A \$2.00 flash light for the highest number of points (each watt being a point), for each of the first three weeks.

A \$15.00 merchandise order as a Grand Prize for the highest number of points for the duration of the contest.

A \$1.00 flash light to each contestant who achieved 1,000 points during the contest.

Besides that there were numerous other prizes, such as theater tickets for orders over a certain number of points, or for a certain number of orders during the week, etc. Each contestant presenting a single order of 2,000 watts or over was credited with a bonus of 25 per cent additional points. In the beginning of the contest it was thought advisable to stimulate registration and so 100 extra points were given to each contestant who would bring in another contestant for registration.

The special events and each week's results were announced in letters written to each contestant and



**INTELLIGENT
ELECTRIC
SERVICE**
PHONE PROSPECT 230

Kindly send the Lamps checked below:

..... 10 Watt Edison Mazdas.....	\$.35 each.....
for use in Halls.	
..... 15 Watt Edison Mazdas.....	.35 each.....
for use in Dressing Closets.	
..... 25 Watt Edison Mazdas.....	.35 each.....
for use in Bathroom and Pantry.	
..... 40 Watt Edison Mazdas.....	.35 each.....
For General Lighting.	
..... 50 Watt Edison Mazdas.....	.35 each.....
for General Lighting.	
..... 50 Watt White Mazdas.....	.65 each.....
the new Gas Filled Mazda.	
..... 60 Watt Edison Mazdas.....	.40 each.....
for Reading Lamps.	
..... 75 Watt Edison Mazda C.....	.70 each.....
(Gas Filled)	
..... 100 Watt Edison Mazda C.....	\$1.10 each.....
(Gas Filled)	
for Kitchen and Indirect Lighting.	
LAMPS FOR STORE USE	
..... 75 Watt Daylight Lamps.....	\$.80 each.....
..... 100 Watt Daylight Lamps.....	1.25 each.....
the latest improvement	
for Store Lighting.	
..... 200 Watt Edison Mazda C.....	2.20 each.....
(Gas Filled)	
..... 300 Watt Edison Mazda C.....	3.25 each.....
(Gas Filled)	
..... 400 Watt Edison Mazda C.....	4.30 each.....
(Gas Filled)	
..... Total Points.....	Total Value.....

Signed by Purchaser

Address.....

Solicited by

Post cards listing the types and prices of lamps were supplied to contestants for the convenience of customers and competitors. The company's name and address is printed on the reverse side.

in at least one order from his mother if no other.

Copies were also printed, giving the prices of the different types of lamps and a space for the contestant's name and signature of the purchaser. These were in the form of a post card, and so could be mailed and the lamps delivered without the cards being brought into the store. Each contestant was given as many of these as he thought he could use when he registered, and came into the store at any time for additional cards when his supply was exhausted.

Financing A Retail Business

(The question of time payments, which most dealers now find to be an indispensable part of business, gives rise to various problems in financing. Below are described several schemes which are helping the dealer to solve these problems, and making time payments an asset instead of a risk.—The Editor.)

INDEPENDENT MERCHANTS FINANCING

The Republic Finance & Investment Company of Indianapolis, Ind., have an exceptional plan of financing electrical merchants selling electrical appliances on the instalment plan which enables the merchant to handle an unlimited amount of instalment business and at the same time establish him-

be turned in and will turn over that amount less their service charge which varies according to the average length of time the schedule of leases have to run.

Accounts maturing by weekly or monthly payments within 7 months charge 7%; within 9 months charge 8%; within 11 months charge 9%; within 13 months charge 10%; within 15 months charge 11%.

In this particular case, 11 months, on which the charge is 9%, charged of course on the 80% only. In other words, 80% of \$558.50 is bought by this company or \$446.80. From this amount a service charge is deducted of \$40.21, the merchant receiving \$406.59. Therefore the merchant actually received immediately from instalment sales amounting to \$677.50—cash at time of sales \$119.00 and \$406.59 on this plan, or a total of \$525.59, and has a reserve of 20%, or \$111.70, which he has coming in as an income for the 11 months time the schedule has to run, as he pays back to the Republic Finance & Investment Co. only 80% of the instal-

REMITTANCE REPORT

REPUBLIC FINANCE AND INVESTMENT CO.
INDIANAPOLIS, INDIANA

15 October 1919

GENTLEMEN: We Report Payments On Your Leases For The Week Ending 10 October 12:19

Remittance Herewith Enclosed \$126.52

SCHEDULE	AMOUNT	SCHEDULE	AMOUNT	SCHEDULE	AMOUNT	SCHEDULE	AMOUNT
# 1	16.52						
2	11.50						
3	9.67						
4	22.58						
5	15.21						
6	17.67						
7	20.72						
8	16.50						
Total	\$126.52						

Below Please Note Repayments? Cashes and Charges of Address

Change of address: Lease #75 John J. Smith to 1318 P St. Newark, Cal.

When Printing On, See

Report for Republic Finance and Investment Co.

Weekly payment or remittance form of the Republic Finance and Investment Company. The merchant after getting his money to run his business pays it back as it comes in.

self as an independent and successful business merchant. Their plan confines their business relations to the merchants only and the merchant's customers know nothing of their financing transactions.

The Republic Finance & Investment Company made an agreement with the merchant to buy 80% of the accounts which he may list on their schedule forms. When making this agreement with him, they ask him to fill out a combined financial statement make an agreement with the merchant to buy 80% and an application for a fidelity bond, as they buy the accounts and immediately authorize him to act as their agent in making the collections, and for this purpose they bond him at a small expense to him (usually \$15 to \$25 per year), using the financial statement for this purpose.

Schedule forms are then furnished the merchant on which he lists such instalment leases or contracts as he may have on hand. Any number of leases from 3 to 40 can be listed on one schedule form, as the merchant sees fit to list them.

The company have made an agreement to buy 80% of the unpaid balance on any schedule that may

SCHEDULE

CONTRACTS, LEASES, NOTES OR ACCOUNTS OFFERED FOR SALE TO
Republic Finance and Investment Company
Indianapolis, Ind.

Account No. 2

Seller's Schedule No. 2

Schedule 100's \$677.50
Reserve 20% \$111.70
Charged 80% \$446.80
Service 5% \$40.21
Check \$406.59
Number 874,199

S. & I. Co. No.	SELLER'S NO.	NAME	ADDRESS	CITY	STATE	Date of Sale	Amount of Contract	Amount Paid	Amount Due	Interest	Next Payment
72		George A. Brown	San Francisco	Cal.	8/25	105.00	30.00	135.00	10.00	10/25	
75		John J. Smith	Alameda	Cal.	8/29	85.00	15.00	70.00	8.00	10/29	
79		Alfred Breiner	Oakland	Cal.	9/4	180.00	35.00	145.00	15.00	11/4	
80		Gao, A. Andrew	San Francisco	Cal.	9/7	47.50	9.00	38.50	4.00	11/7	
82		William Adolph	Perkeley	Cal.	9/12	200.00	20.00	180.00	18.00	10/12	

WEEKLY ALLOWANCE \$9.67

Schedule form of the Republic Finance & Investment Company showing a listing of five leases. By dividing the unpaid balance by the monthly instalments due one can ascertain the average length of time the leases on this schedule have to run.

ments that are due on this schedule or 80% of the \$52.00 which amounts to \$41.60. This company feels that a substantial business merchant will not dispose of all his instalment income and for this reason hold this reserve as they want him to have at least 20% of his instalment business as an income to carry his overhead during possible slow seasons, therefore they hold this reserve but allow him to keep the collections on it. This company has also found that it is much easier for the merchant to send in these amounts weekly instead of monthly and therefore they have a weekly payment or remittance form which simplifies all work connected with this part of the plan, as each schedule is numbered

The next step is for each dealer who desires to avail himself of the plan to get in touch with a Morris Plan bank or fiscal agency. By reference to the list of Morris Plan banks and fiscal agencies accompanying the pamphlet it will be seen that the

names of a number of the banks so listed are marked by a star, like this (*Birmingham). Morris Plan banks so marked are now prepared to handle Retail Trade Acceptances. The starred list will be increased from time to time as the remainder of the 102 banks are supplied with acceptance forms and methods.

A retail dealer who desires to use this plan should get in touch—personally or by correspondence—with the nearest Morris Plan bank that carries a star before its name. As the dealer's endorsement must appear on all Retail Trade Acceptances handled by the bank, and as the bank will look to him in case the customer finally fails to pay, the dealer is required to give to the bank a financial statement on which he is granted a certain line of credit, which means that he can turn over acceptances to the bank until he has reached the maximum established for him.

These details being settled and the contract signed, the dealer is furnished with all the necessary blanks and forms.

These forms are quite simple, consisting of a Morris Plan Retail Trade Acceptance and a Conditional Sale Agreement (or other lien on the article sold).

Both of these forms are printed on the same sheet and the customer is required to sign his name only twice.

A twelve months' time-payment sale on this plan would work out in this way: Assume that the article sells for \$150 and the dealer requires 20 per cent down. In addition to the \$30 cash payment, the customer is required to pay at the same time 6 per cent discount on the \$120 Retail Trade Acceptance, which represents his obligation, and 1 per cent of the selling price of the article (or \$1.50) as fire insurance for one year on the article purchased.

The dealer is required to pay a service fee of 2 per cent of the face value of the acceptance, or \$2.40, for the actual service of the Morris Plan bank in handling the transaction.

The transaction works out in figures as follows:

Article selling for.....	\$150.00
Down payment, 20%.....	30.00
Balance	\$120.00
Trade Acceptance	120.00
Twelve months' time	
Customer pays \$10.00 a month.	
Customer pays cash:	
Down payment	\$30.00
6% Discount on \$120.00 Trade Acceptance for 12 months.....	7.20
Insurance (1% of selling price).....	1.50
Total cash paid by customer.....	38.70
Dealer receives:	
From customer (as above)	\$38.70
From Morris Plan Bank the face value of Trade Acceptance (\$120.00), less discount, \$7.20; and insurance, \$1.50; or \$8.70	111.30
	\$150.00
Dealer pays 2% of acceptance as service fee.....	2.40
Dealer receives net	147.60

From the above it will be noted that the dealer receives \$147.60 for the article, which is \$2.40 less than the cash selling price, the difference representing the bank's charge to the dealer for the service. Through this arrangement the dealer obtains cash for the sale of the article, and he steps out of the transaction at once except as he is contingently liable in case the customer fails to pay, and the

ordinary collection proceedings instituted by the Morris plan are unavailing.

The dealer requires the customer to sign the Conditional Sale Agreement which is attached to the Trade Acceptance, and he draws the Trade Acceptance for \$120 on his customer, and the customer accepts it by writing his name across its face.

Thereupon the dealer endorses the Trade Acceptance and takes or sends it to the Morris Plan bank with which he deals. The Morris Plan bank sends a check for the face value of the Trade Acceptance to the dealer less discount, service fee and insurance as shown above.

On the same day the Morris Plan bank sends a letter to the customer giving the details of the transaction in order that the customer may check it up, and at the same time the bank encloses a coupon book which must be used in making payments at the bank. As the above transaction runs for twelve months, the payments will be \$10 a month, and the days of the month on which payments are to be made are stated clearly in the coupon book.

The customer thereafter makes his payments at the Morris Plan bank—or through a special arrangement the payments may be received by the dealer and turned over to the Morris Plan bank.

A WORKABLE SCHEME

An interesting system of financing once used by the Hoyt-Dickinson Piano Company is as follows: The company got one of the members in a local bank to act as trustee, paying him a small wage of about \$20.00 a year for his trouble, which was merely nominal. People were found who were willing to

PIANO COLLATERAL BOND	
Missoula, Montana, _____ 191__	
Thirty months after date, for value received, the undersigned on presentation and surrender of this Bond	
will pay to _____	
DOLLARS	
with interest at the rate of eight per cent per annum, payable on the 10th day of the months of January, April, July and October after the date hereof.	
This obligation is made subject to and is governed by each and all conditions printed on the back hereof, which conditions enter into and are a part of this obligation.	
HOYT-DICKINSON PIANO CO.	
No 1036	By _____

The form of bond used by the Hoyt-Dickinson Piano Company. The terms of the contract are printed on the inside, and the trustee's certificate on the back.

loan money with interest at 8% per annum, payable quarterly, and receive the company's special bond for the amount, which they took to the trustee. He signed it, stating that he held piano paper or notes as security for the benefit of the bond holders in an amount which exceeded the liability of the company on the bonds by 33 1/3%. These notes were to be kept 85% unmatured by the company. In other words if the customer did not make the payment which his note called for, the company had to pay it to the trustee anyhow, with an allowance of 15%. All payments on the notes received by the company were turned in to the trustee once a month, and he used this money to pay the interest and the bonds as fast as the money came in, the company reserving the right to pay off the bonds at any time before the thirty months had expired.

Electrical Instruction in a High School

BY A. L. JORDAN

(The high degree of specialization required in the scientific world is causing more and more emphasis to be laid upon technical education in the high schools. The provision which is made for this in the way of courses of instruction and laboratory equipment in a San Francisco school is described here by the head of the electrical engineering department of the San Francisco Polytechnic High School.—The Editor.)

The Polytechnic is one of the five public day high schools of San Francisco. In 1913 the Board of Education, through the Superintendent's office, reorganized the courses of study, and the one outlined here is one of the many offered to the young men and women of the city.

In this school the subject of "General Science"

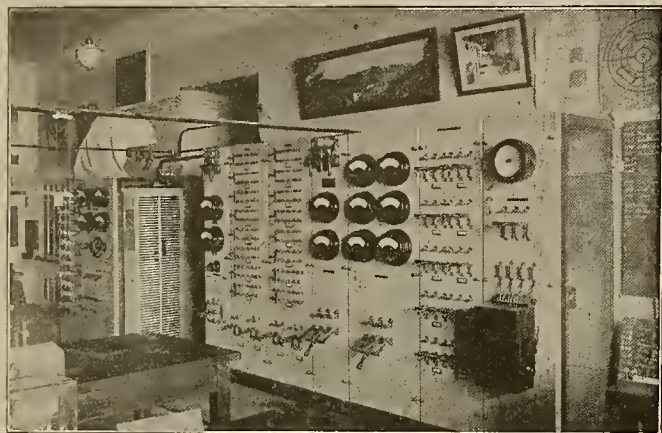


Fig. 1. Main switchboard in the electrical laboratory of the San Francisco Polytechnic High School

is given to the first year students, and at the opening of the second year a separation of the students into two groups is made. One group, called the "College Preparatory," is offered the regular preparation in Science given in most of the high schools of the state; the other is given greater freedom in electing which subjects they are to study in preparation for their life work. A description of the electrical instruction given these "non-college" students is the purpose of the present article.

Plan of the Course

The courses in Electricity are preceded by a one-year course in Elementary Physics, taken during the second year, which includes laboratory experimentation, and which covers the elements of electricity. It should be understood also that an Electric Shop course (in the Mechanical Arts Department) is open to the students, where construction rather than experimental work and testing is the main purpose.

The third year course is entitled "Direct Current Electricity" and, beginning with the simpler experiments on magnetism, annunciator circuits, fall of potential, etc., it passes on to work with voltmeters, ammeters, galvanometers, the Wheatstone bridge, rheostats, wattmeters, watt-hour meters, storage cells, etc. Tests are made of the principal kinds of direct current motors and dynamos; for example, the current-voltage characteristic of shunt, flat-compounded and over-compounded dynamos, the no-load characteristic, speed-load characteristics of shunt and series motors, also current-torque curves of these two motors. Some experiments are made on the

magnetic qualities of iron, on electric heating, insulation resistance, line losses, the three-wire system of distribution, watts per candle power of lamps, elements of armature winding and Prony brake tests of motors. One new experiment is that with an electromagnetic transmission dynamometer built by the Diehl Company of Elizabeth, N. J.

Experimental Work

The course in alternating currents, which occupies the fourth year, involves only elementary mathematics, and consequently does not attempt electrical machine design; but the students have had algebra, geometry and a little trigonometry and can make the necessary calculations. The experiments include

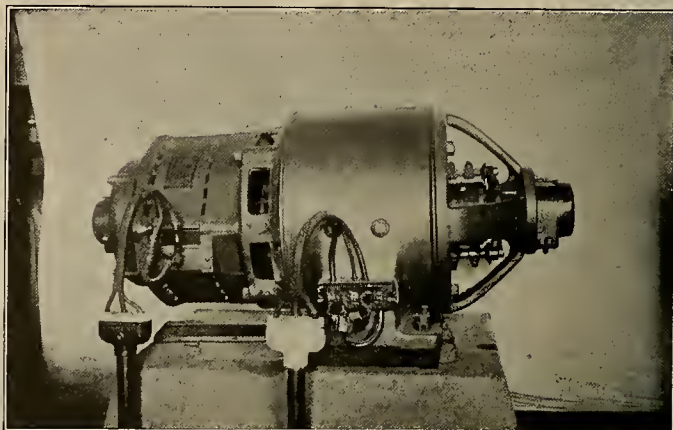


Fig. 2. Hawthorne motor generator set, 10 hp., used to furnish direct current for general purposes.

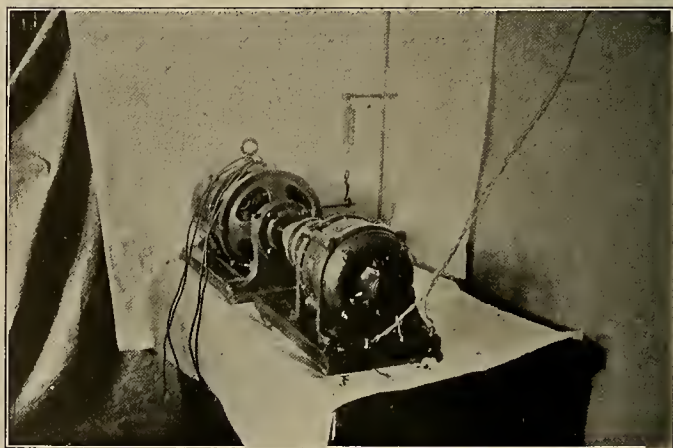


Fig. 3. Transmission dynamometer test of a small two-phase induction motor.

simple tests of transformers (ratio and voltage tests), the measurement of inductance, study of fuses and circuit-breakers, measurement of capacity, the single-phase a.c. dynamo, power-factor, frequency, two-phase current, the rotating field, two-phase motors, voltage relations of two-phase circuits, starting compensators, synchronous motors, various kinds of single-phase motors, transformer

tests, calibration of ammeters and voltmeters, tests of a belted and a direct-connected motor-generator set, also a rotary converter, study of watt-hour meters, plotting hysteresis loop curves of iron, a variable

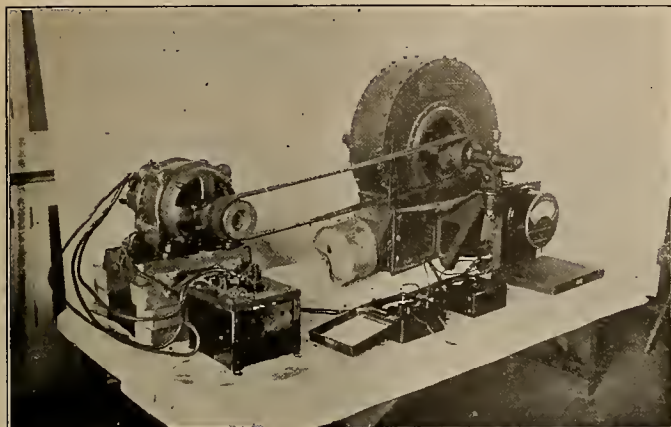


Fig. 4. Set-up for testing a variable speed wound rotor 2-phase motor. The rheostat is shown, also the instruments for getting the apparent power and the real power, and the blower used for loading.

speed two-phase motor, and the Scott transformation from two to three-phase current.

Both of the courses mentioned include recitations, lecture-table experiments and sets of numerical problems. Visits are made to power stations and other centers of interest.

Laboratory Equipment

Fig. 1 gives a view of the main switchboard which furnishes direct current, single-phase and two-phase alternating current to other parts of the building as well as to the smaller switchboard seen in the background of the picture, and to various terminals in the room. A Hawthorne motor-generator set (10-hp.) is used to furnish direct current for general purposes; it has the valuable feature of an external resistance strip whose value may be altered, thus changing the amount of compounding. This gives opportunity for an experiment where the students get readings of voltage and current for various loads and plot the corresponding characteristic curves. Fig. 3 shows the transmission dynamometer test of a small two-phase induction motor (foreground). In the background is seen the dynamometer with a spring balance attached to a rod projecting a measured distance from the field frame. When the armature is generating a current it exerts a torque upon the field, which is mounted on pivots. The field, therefore, can be kept "floating," and from the balance reading the "arm" of the balance and the revolutions per minute, the horsepower of the driving motor can be calculated. This is the system used by some of the largest automobile manufacturers in the testing of their motors and is a step in advance of the electrical method (measuring output of a dynamo), which in turn is better than the old Prony brake method. Fig. 4 illustrates a set-up for testing a variable speed wound rotor (G-E "MQ") 2-phase motor. In the picture can be seen the rheostat, and the instruments for getting the apparent power and the real power, also the blower used for loading. The power-factor is then obtained by dividing the real power (wattmeter) by the product of the voltmeter and ammeter readings.

Among other apparatus is a motor-generator set (Ft. Wayne type) which is used for several purposes. One machine can be supplied with direct current and the field of the other from the same source; then the latter delivers alternating current at various frequencies. By getting the input of the motor (d.c. instruments) and the output of the generator (wattmeter) the overall efficiency can be calculated. In another experiment with this set, characteristic

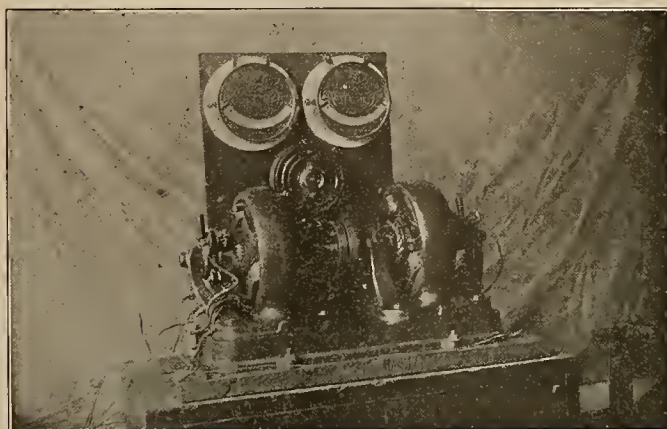


Fig. 5. A Ft. Wayne type motor generator set in which the alternator can be used as a synchronous motor and the d.c. machine be driven as a generator.

curves of the alternator are plotted. In still another, the alternator is used as a synchronous motor and the d.c. machine is driven as a generator.

Qualifications of Students

These experiments will give an idea of the kind of work done, and it will be seen that it is of the same nature as that given in a "Junior College," except that the calculations are mostly arithmetical. There is no pretense made that the young men who have completed this course are "electrical engineers," but it should be evident that they should be able to do intelligent buying, some installation, and a considerable amount of operating of the commonly used electrical machines. Besides this, they are able to read the literature of the electrical profession, so that by means of books and particularly the electrical journals, they are able to advance themselves in that profession.

VOCATIONAL EDUCATION

An address on vocational education for the business of exporting, made before the foreign trade convention, included the following statement:

The most important factor in the creation, life, and success of foreign trade is the cooperation of the employers in business houses with the teachers. Granted that these schools must teach those things that will make the student valuable to the business house, conversely the business house must give preference to the graduates of such training when they are hiring men. The closest cooperation must be maintained between the business house and the teaching.

The business house, therefore, must cooperate, in the first place, with the high school. The essential point is that if the business house signifies its intention to employ a number of junior clerks every year—conditions being normal—it shall pick out at the end of the junior year likely commercial high-school pupils who have taken the commercial course up to that point, and shall give them places as messengers, or at small desks, during the summer. The high-school pupil, therefore, when he goes back to his school, will go back with his interest awakened by having been in contact with actualities.

Arc Welding

BY F. A. ANDERSON

(Arc welding, though a comparatively recent development, is coming to hold an important place, especially in shipping work. The following analysis of some of the factors in electric welding is the first of a pair of articles on the subject by the inspector for the U. S. Shipping Board in San Francisco.—The Editor.)

THE RELATION BETWEEN ELECTRODES AND PARENT METAL

In the minds of many people the term "welding" means only the process employed by the blacksmith who heats his metal in an ordinary forge until the proposed abutting surfaces have reached the desired heat, when by a process of hammering and working he brings the parts together into a



Turnings from welded material showing ductility and uniformity of the metal after it has passed through the arc.

homogeneous union. However, those thoroughly conversant with the art recognize without reservation that the many processes of autogeneous welding produce most satisfactory results.

Electric Arc Welding —

Electric arc welding is one of the autogeneous processes, and while it originated about twenty years ago, it has not been universally practiced until within the last few years. It is susceptible to the faults of all welding; it is capable of accomplishing most every desired operation and has proven its ability to be used in difficult places where other processes cannot be conveniently employed.

Welding Faults —

So-called "burned metal" is common to all welding, and the blacksmith at his forge must use care to avoid it; the gas-welder must give careful attention to his flame and guard against the same fault, while the electric "arc welder" must adjust his current and hold his arc, in order that he may not meet with the same failure.

Shrinkage cracks are another fault usually produced by too great a heat, and care must be exercised to avoid them in every process.

Insufficient heat is also a fault, and results in the two metals failing to form a proper union.

This article will deal more particularly with the electric welding of ferrous metals and as the particular kind of this metal usually welded is what is generally known as "steel" in its various grades, this type of metal will first be considered.

Ship's Plate —

Much recent interest has been aroused in electric welding in connection with ship's construction; it is therefore well to consider the composition of the steel plate used in ships. These plates range in tensile strength from 58,000 to 72,000 lbs. per square inch. They vary in carbon content from .14 to .28; in manganese from .30 to .46; in phosphorus from .027 to .043; while sulphur is found in some as high as .05 and silicon to about .05.

Mild Steel Electrodes —

What are known as mild steel electrodes are obtainable on the market, manufactured by various



Welding a dipper pan—a piece of very light work in steel. The skill of the operator in adjusting his instrument has much to do with the homogeneous character of the weld.

companies and these vary widely in their chemical composition—carbon from .08 to .25; manganese from .25 to 1.00; phosphorus from .025 to .06; sulphur from .024 to .06; silicon from .016 to .08. The Welding Committee of the Emergency Fleet Corporation, which has lately merged into the American Welding Society, proposed a specification for a mild steel electrode of the following chemical composition:

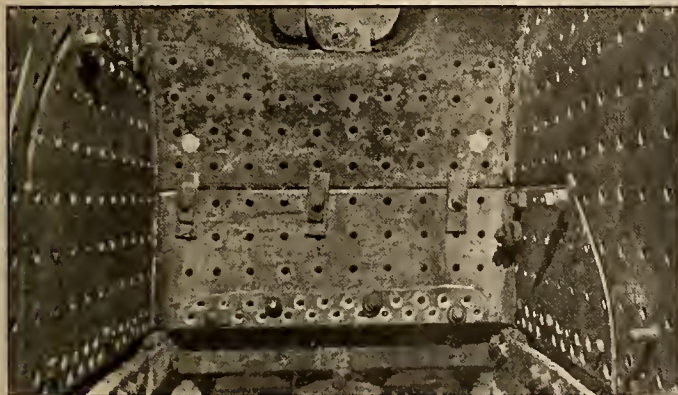
Carbon	Not over	0.18%
Manganese	"	0.55%
Phosphorus	"	0.05%
Sulphur	"	0.05%
Silicon	"	0.08%

Effects of Copper and Aluminum —

Some manufacturers have added to the composition of their electrodes a content of copper, while others include a small amount of aluminum; both these ingredients tend to cleanse steel and add some-

what to its ductility and toughness. Both are valuable properties and if a combination with these ingredients can be obtained in a manner permitting them to be carried through the arc and re-established in a proper co-related order in the welded material their value will be increased.

Copper is included in the original composition of some electrodes, while in others it is used as a



An example of the welding of large plates in ship work. The upper picture shows the work cleaned and ready for welding and the lower shows the completed job.

coating. Aluminum is used as a cleansing agent in the original metal for some electrodes, but is usually absorbed in this service and does not seem to re-appear in sufficient quantity to be detected by chemical analysis. Another method of using aluminum is to wrap an aluminum wire of proper size around the electrode, which includes it in the welding operation. Here again it seems only to perform its cleansing power and fails to re-appear in the chemical analysis of the welded material.

There is another type of electrode included in this class and used for general ferrous metal work. It is what is known as the "pure iron" electrode. Its carbon content is low, varying from .01 to .05, with manganese from .02 to .18; phosphorus, .005 to .04; sulphur, .007 to .025 and silicon, .005 to .08. This type of electrode is very popular among many users and I recall one installation where arc welding has been an accepted practice for a number of years. Here they have adopted such an electrode and make their standard size 5/32" adjusting all stations (of which at the time they had about 30) to give the

best universal result in volts and amperes and maintaining this adjustment without change, although their work ranged from very small to very large pieces and from small to large sectional areas.

Welded Material Analysis —

The following chemical analysis may be of interest in showing some instances of results obtained in arc welding. The first table shows analysis of electrodes in their original state and the second table the analysis of the welded material.

Designation	ANALYSIS OF ELECTRODES				
	Carbon	Mang.	Phos.	Sul.	Sil.
1	0.16	0.56	0.032	0.024	0.016
2	0.13-0.17	0.50	0.012	0.045	0.011
3	0.01	0.025	0.005	0.025	0.005
4	0.16	0.56	0.032	0.024	0.016

Designation	ANALYSIS AFTER PASSING THROUGH ARC				
	Carbon	Mang.	Phos.	Sul.	Sil.
1	0.05	0.18	0.031	0.036	0.011
2	0.14	0.14	0.012	0.039	0.011
3	0.25	0.23	0.0018	0.075	Trace
4	0.27	0.22	0.0018	0.076	Trace

In the foregoing tables items one and two are taken from a report by Captain Caldwell of the British Navy, while items three and four are from tests conducted under the author's directions. As the carbon content in the "analysis after passing through arc" of specimens three and four was questioned, a second sample was sent to the chemist who verified the result.

On pieces 3 and 4 the deposited metal formed a homogeneous mass and united with the parent metal, a cross section through the piece showed no line of demarcation between the parent metal and that which had passed through the arc except by the use of a magnifying glass, the two metals then showing a very similar structure.

The Manufacture of Metals —

In the manufacture of metal the material containing the desired ingredients is first cast into "pigs" or "billets." From these "pigs" the metal is re-cast, worked or wrought into its finished product and by this process, gaining much of its physical properties.

Again bringing this metal to a molten state reduces it, when properly cooled, to a condition closely akin to that of its billet formation. It loses some of its physical properties and will not be as high in tensile strength, ductility or elasticity, as it was in the wrought state. It is to conserve the greatest per cent of these properties that research and experiments have been made. In these experiments arc welding has given excellent results.



Sample of ferrous work in the welding of a ship's rudder. Arc welding is coming to play an important part in the shipbuilding industry.

THE ELECTRIC FURNACE IN OPERATION

(The consistent success of the electric furnace in the heating of metals is attested by constant reports from all over the country. One of the recent interesting installations in the Northwest is described below.—The Editor.)

A new installation at the Lamb Machine Company's plant, Hoquiam, Washington, consists of the newest design of rolling cylinder type of Greene Arc Furnace.

The furnace is supported in the usual way on rails on which it rolls over for the purpose of pouring the charge. The tilting of the furnace is accomplished by two hydraulic cylinders attached to the



Rolling cylinder type furnace in use

end of the furnace shell and operated by a four-way valve. The tilting of the rolling cylinder type Greene Arc Furnace is an important operating feature. The furnace is especially easy and quick to operate in either pouring or in cutting off the metal stream when the ladle is filled. It is provided with a special attachment to the spout whereby the shank ladles are supported for filling without the use of more than one man, who operates the furnace tilting valve. The spout is especially designed to take this attachment and the ladles may be filled without any spilling of metal. The charging door of the furnace is opposite the spout. This is raised or lowered by means of a double acting hydraulic cylinder, the operating valve of which is arranged conveniently for the furnace operator. The door is designed so that it practically seals itself and thus keeps air out of the furnace. The roof is constructed of only standard shaped bricks with the exception of one special shape which makes the electrode holes.

This furnace is provided with two electrodes through the roof, and has a bottom electrode underneath each top electrode so that each phase operates independently. The power is furnished to the electrodes at 110 volts on each arc, and the electrical equipment consists of two Packard electric furnace transformers of 250 kva. each taking current at 2300 volts, 3-phase, and supplying 110 volts, 2-phase. These transformers are specially designed with the

reactance within the transformer case and their operation has been highly satisfactory.

The meter panel is located in the wall of the transformer room and contains the ammeters which serve for the controlling of the current in each electrode circuit. The panel also contains a graphic curve drawing watt meter, which serves to regulate the maximum demand of the furnace. The other regular standard instruments are provided on the panel, including volt meter, clock, watt hour meter and overload relays. The operating lever for the high tension oil switch is located immediately beneath this panel and in convenient reach of the furnace operator.

This furnace is not provided with automatic control motors, but is so designed that these may be installed at any time. Automatic control motors have recently been installed on a Green Arc Furnace at the Pacific Car & Foundry Company's plant at Renton, Washington, and are operating with special satisfaction.

A German Spy

—fleeing from justice, is said to have jumped into his office files. He has never been found since.

ARE YOUR FILES IN THIS CONDITION?

There is one problem which every business has in common—the caring for current information so that it may readily be utilized when needed. Recognizing the importance of proper filing systems to all branches of the electrical industry, from the contractor-dealer to the power company, the Journal of Electricity has arranged with Miss Irene Warren, director of the Chicago School of Filing and Indexing, to present the subject of

OFFICE RECORDS—THEIR FILING AND INDEXING

in a series of twelve articles, beginning with the issue of January first. The comprehensive helpfulness of these articles, which cover every general and special problem which will arise in your office routine, may be judged from the subjects planned:

1. The Central Filing System and the Department files.
2. Equipment and Supplies—What to buy and where to buy it.
3. The Alphabetic Name File.
4. Alphabetic Systems Coded—What they are and how to use them.
5. Geographic Arrangement.
6. Numeric Filing.
7. Subject Filing—the decimal arrangement.
8. The use of the files—How to charge material and regulations for users.
9. Card Records.
10. The Transfer, Follow-up Systems.
11. Problems of Supervision and Administration.
12. The Filing of Special Records.

Beginning Next Issue

SEE TO IT THAT YOUR FILES ARE A
PLACE FOR OBTAINING INFORMATION
—NOT LOSING IT

The New Physics

BY A. C. CREHORE

(The characteristics of atomic structure as it affects fundamental equations are here discussed. The author indicates a reciprocal relationship between velocity and the dimensions of specific inductive capacity. This is the third of a series of articles which present an entirely new basis for physics. Dr. Crehore is well known as a pioneer and authority in this field.—The Editor.)

It will be attempted in this section to give the reasons that have led to the belief that the dimensions of specific inductive capacity are the reciprocal of a velocity. Certain preliminary conceptions must, however, first be mentioned that may, perhaps, seem to lead us far astray from the point we are intending to discuss.

The first theory of atomic structure which had a definite form is that due to Sir J. J. Thomson, proposed at a time not long after his discovery of the existence of the electron. He postulated that each atom consisted of a sphere of positive electrification of fairly large dimensions, comparatively speaking, within which a number of electrons each having the same charge of negative electricity were circulating in orbits. His reason for assuming this positive sphere of electrification was undoubtedly for the purpose of retaining the negative electrons in a united system; for, it is supposed that negative electrons repel each other, and some means of counteracting this repulsion was required. This arrangement secured equilibrium for the circulating electrons.

At a subsequent time Sir Ernest Rutherford showed by means of his experiments on the scattering of the so-called alpha particles by matter that it is most probable that the positive charge of an atom cannot occupy the very large dimensions that Thomson assumed that it had, and that the dimensions are required to be very small indeed, even smaller than the dimensions of a single electron, and yet it was also thought that almost the whole of the mass of the atom resides in this very small positive nucleus as it is now called. Rutherford was supported in this view by the current form of electromagnetic theory as applied to either the atomic nucleus or to an electron. How this may be again requires a digression from the main topic before us, but it is very essential to understand what it is that electromagnetic theory has to say about this matter.

Properties of the Electron

Several forms of electron have been proposed by different investigators, but the so-called "solid electron" due to Lorentz has received the most attention, and partly for the reason that it is more amenable to mathematical treatment than the other forms. At rest this electron has a spherical shape with a definite radius and the electrical charge is distributed throughout the whole volume of it. Each element of this charge is supposed to repel every other element, and the effect of them all together is to produce a very great pressure at the surface of the sphere tending to expand the volume of it. It is further supposed that this great pressure is counterbalanced exactly by a sort of hydrostatic pressure exerted over the entire surface of the sphere. The

mathematical treatment of the case by means of electromagnetic theory is not very simple and we shall have to limit ourselves here to the mere statement of some of the conclusions deduced from this form of electron.

It has been found, first, that the mass of the electron is not fixed and constant, but that it changes in value according to its velocity of translational motion. Moreover, that it differs from all other bodies that have ever been known before in that its mass is different when considered in the direction of its motion, the longitudinal mass, than it is when considered in a direction perpendicular to its motion, the transverse mass. However, the expressions for these masses as dependent upon the velocity show that there is very little change in the mass before its velocity is very great indeed, something like the tenth part of the velocity of light. For all values of its velocity less than this the longitudinal mass and the transverse mass have the same values approximately, namely

$$m = \frac{4}{5} \frac{e^2}{c^2 a},$$

where m is the mass, a the radius of the sphere, e the electrical charge of it, and c the velocity of light. The importance of this formula can scarcely be emphasized enough. Among other things it has led to the belief that specific inductive capacity has the dimensions of the reciprocal of a velocity, which is the topic immediately before us.

Nucleus of the Atom

Let us first see how this formula bears out the idea of Rutherford alluded to above. It is well known that the mass of the hydrogen atom, the lightest of all kinds of atoms, is very large by comparison with the mass of one electron, about 1846 times as great. If there is only a very small number of electrons in the hydrogen atom, as there is supposed to be on very good evidence, then it is obvious that practically the whole mass of the hydrogen atom must be concentrated in its positive nucleus, for there is nothing else in the atom. In a neutral hydrogen atom the charge of the positive nucleus is equal to the sum of the charges of the electrons in it, hence, the e of the above formula must be very nearly the same for the electron as it is for the nucleus. But the mass of the nucleus is very much greater as shown, and hence it must be that the radius of the nucleus, which is inversely as the mass, is very much smaller than that of the electron. All this, of course, is on the supposition that the whole of the mass of the atom is purely of an electrical origin as represented by this formula. This idea is substantiated the more we find out about all of these matters.

Now this result justified Rutherford in supposing that the nucleus of an atom is very small indeed, smaller than that of the electron itself, and this was borne out by his experiment on the scattering of the alpha particles. It discredited the older Thomson theory which had the electrons immersed within the large sphere of positive electrification, thus making it many times larger in volume than the sphere of the negative electron. The Thomson atomic theory has accordingly been abandoned and the Rutherford theory taken its place. But with the abandonment of the Thomson theory went out also the benefit that it conferred of providing the means of securing stability for the electrons in orbits. Rutherford had no means of providing stability for the electrons in his new form of atom, but in spite of this his ideas have prevailed because they are supported by such strong evidence. There was the hope at least that something would appear to relieve the difficulty, even if electromagnetic theory as it then existed did not offer any solution of the problem.

Remarks on Electromagnetic Theory

It was known at the time that Rutherford proposed his theory that electromagnetic theory had already proved to be deficient in other directions. In particular Max Planck had made his startling proposal that the flow of energy probably takes place in what he called quanta, that is to say in multiples of a fixed minimum of energy, and this implied that energy partakes of a quasi atomic nature. This proposal was originally made on the strength of the known experimental facts connected with the radiation of energy by matter. Electromagnetic theory had proved itself incapable of giving results in agreement with observation in this instance, and Planck did not hesitate to lay it aside. It is not proposed to enter into any discussion of these matters here more than to say that the ideas of Planck were receiving confirmation with a rapidity that probably exceeded his expectations as time went on, and they have now taken rank with other established physical facts irrespective of any difficulty in understanding them by means of electromagnetic theory.

But, to discredit electromagnetic theory at one point and still retain it at another is what we have really been obliged to do. This may seem to be a very questionable procedure at first thought to some, but it is not disconcerting when we take the proper view of the situation. Electromagnetic theory is still in the process of development as it has been since the beginning made by Maxwell. The original Maxwell equations account for most of the phenomena usually dealt with in the textbooks on Electricity and Magnetism as well as the more recent modifications of this theory, but they are not so general as the recent modifications of this theory, and do not account for certain other phenomena which the modern equations do account for. Here we have a precisely analogous case where the equations are useful for certain phenomena and are not to be trusted for other phenomena. In this instance the reasons why they are not to be trusted are quite apparent to us because we possess the better and more general forms of equations. Similarly, it is easily seen that

other phenomena might arise for which the best equations we now possess lead to error, and it may be expected that the reason for this will appear some time when still more general forms of equations are found. It would be ridiculous to throw away the best equations we now have, which already include a larger variety of phenomena than the earlier ones did, simply because cases have arisen that lie outside of the domain of the equations we possess. Hence it is necessary to learn to diagnose each case as it arises, and to decide whether the present equations are applicable to the case or not. This unsatisfactory state of affairs gives considerable latitude to the investigator, and the use of the word diagnosis is very apt, for to diagnose the case is precisely what the investigator at the present time is obliged to do in much the same sense as the physician makes his diagnosis by the symptoms presented.

Analysis of Mass Formulæ

In the present instance our diagnosis is that the Lorentz mass formula above given is correct, and applies to the case justifying the Rutherford form of atom, as showing that the nucleus of the atom is very small. Let us write down this equation once more as applied to the nucleus of the hydrogen atom. Denoting by e the electrical charge of a single electron, and assuming that there are two such electrons in every normal hydrogen atom in accordance with the author's theory, the charge of the hydrogen nucleus is equal to $2e$ being positive. The Lorentz formula then becomes

$$m_H = \frac{4}{5} \frac{(2e)^2}{c^2 a_H} = \frac{16}{5} \frac{e^2}{c^2 a_H},$$

the subscripts H referring to hydrogen. e and c are the same for hydrogen or any other atom, but m and a are different and require the subscripts. This formula may also be written interchanging the positions of m and a as follows:

$$a_H = \frac{16}{5} \frac{e^2}{c^2 m_H}.$$

The numerical values of the quantities on the right of this equation are all known, and the numerical value of the radius may, therefore, be found. But, in this equation a good example is presented of the usefulness of dimensional formulæ, and both members of the equation should be examined to see that the dimensions are the same. Evidently the dimension of the left member on any system is simply a length, L . The dimensions of e^2 on the electrostatic system were derived above, and they may be taken from Table I, namely, $e^2 = L^3 M T^{-2} k$, also those of $1/c^2 m_H$ are $L^{-2} M^{-1} T^2$. Multiplying these together gives the dimensions of the right hand member of the equation as Lk , and not simply L as in the left member. The equation as it stands is, therefore, according to this sure test not a true equation between physical quantities according to any system of units. To make the dimensions of it agree we must multiply the left member by k or divide the right member by k as we prefer. This cannot of course affect the numerical value, since the numerical value of k is unity on the electrostatic system of

units, but it is most important to express the k , and not leave it to be understood that it is supposed to be there. It is the common practice among writers on electromagnetic theory to suppress the k as being unity and not affecting any numerical values on this account. Its omission, however, naturally leads one to the belief that the writers who suppress it suppose that it is dimensionless as well in terms of length and time. If our units of length, the centimeter, and of time, the second, are changed it will be shown presently that k is no longer equal to unity, and it becomes most important to include it in writing any formula. The revised equation including the k now becomes

$$a_{\text{H}}k = \frac{16}{5 m_{\text{H}}} \left(\frac{e}{c} \right)^2.$$

The dimensions of each member are now $L k$ on the electrostatic system of units. If, however, we give k the dimensions $L^{-1} T$, so as to transfer over to the new space-time system of units, the dimensions of each member become simply a time T , the L 's cancelling out.

Relation Between Constants

This suggests that we make a search for some constant quantity that has the dimensions of time simply, and compare this with the value of the time given in the above equation. The first constant that naturally comes to mind is the time of one revolution of the electrons in the normal hydrogen atom. According to the author's theory of the atom explained in a later section the frequency of revolution is equal to twice the well-known Rydberg constant, which may be denoted by $2K$, K being the Rydberg constant, numerically equal to 3.290×10^{15} , and $2K$ being 6.580×10^{15} revolutions per second. Therefore, the time of one revolution is $1/2K$, which has the dimension of time simply, the dimension of the Rydberg constant being the reciprocal of a time.

Without the numeric $16/5$ in the above equation, it is found that the reciprocal of twice the Rydberg constant is numerically closely equal to the literal part of it, and we obtain a new relation between physical constants,

$$2K = m_{\text{H}} \left(\frac{c}{e} \right)^2.$$

Both the dimensions of this and the numerical values agree. This enables us at once to write down a value for e^2/m_{H} , which may for the present be considered as the unknown part of the equation, as follows,

$$e^2/m_{\text{H}} = c^2/2K.$$

The numerical values of the velocity of light, c , and the Rydberg constant, K , as obtained from observations on spectra, are known with exceptional accuracy. The velocity of light is very close to the number 3×10^{10} centimeters per second, and the Rydberg constant very close to the number above given, 3.290×10^{15} . Using these numbers we obtain a numerical value for e^2/m_{H} ,

$$e^2/m_{\text{H}} = 1.36778 \times 10^8.$$

The decimal places are retained on the assumption that these are the exact values of c and K , and the result may easily be corrected for the very slight departure of c from 3 and of K from 329.

By substituting the value of $2K$ just given in the value of $a_{\text{H}}k$ previously given, we also obtain another important relation

$$a_{\text{H}}k = \frac{8}{5K},$$

thus connecting the radius of the hydrogen nucleus directly with the Rydberg constant, both members of this equation representing a time.

Having obtained a numerical value for the ratio of e^2 to m_{H} , each quantity might be found separately if there were any other experimental relation known between these two quantities. Fortunately there exists such another relation, in which the constants are known with accuracy. This is the constant obtained from the electrochemical equivalent of an element in electrolysis, and the constant may be referred to as the Faraday constant. The relation is

$$\frac{e A_{\text{H}}}{c m_{\text{H}}} = 9649.4,$$

where A_{H} denotes the atomic weight of hydrogen referred to oxygen as 16. Taking the ratio between the values of e^2/m_{H} above given and the e/m_{H} obtained from this, after putting $A_{\text{H}} = 1.008$, and $c = 3 \times 10^{10}$, we obtain a numerical value for e , namely

$$e = 4.763 \times 10^{-20} \text{ electrostatic units,}$$

and using this numerical value of e , we get a numerical value for m_{H} , namely

$$m_{\text{H}} = 1.658 \times 10^{-24} \text{ grams.}$$

It is considered that these numerical values for both e and m_{H} are within the limits of error in the direct experimental measurement of these important constants. The best value of e obtained by Millikan by the use of his oil-drop method is 4.774×10^{-10} , and his value for m_{H} is 1.662×10^{-24} . By giving more attention to the best known values of c , K , and A_{H} the numerical values here given may be modified very slightly, but it is considered that these theoretical values of these constants will be the most reliable when these small corrections are properly attended to.

There is another experimental constant also known with considerable accuracy, from which a numerical value of the mass of the electron itself may be obtained. This is the ratio of e to cm_0 , namely

$$e/cm_0 = 1.767 \times 10^7,$$

as determined by Bucherer, where m_0 signifies the mass of the electron at slow velocities. By the use of this and the previous value of e we find

$$m_0 = 0.898 \times 10^{-27} \text{ grams.}$$

Technical Hints

BY LOUIS ETSHOKIN

(The commutator being one of the most frequent causes of trouble in direct current machinery, the following exposition of the principle of operation of the device will be of practical aid in the solution of operating difficulties connected with it. The author is electrical engineer with the Halcun Radio Company of San Francisco.—The Editor.)

PRINCIPLES OF COMMUTATION

As the most troublesome part of a D. C. machine is the commutator, a thorough understanding of commutator principles is essential. Let us take

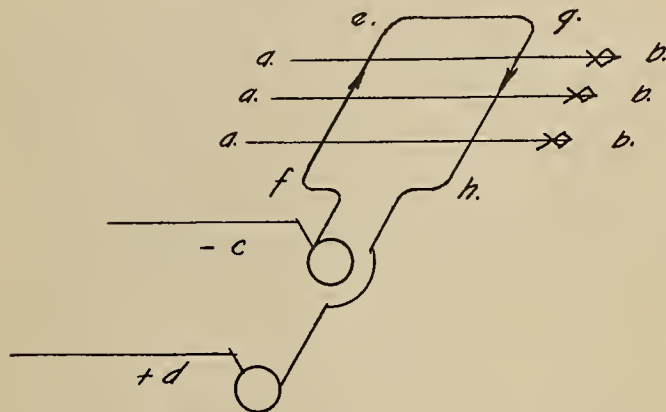


Fig. A.

Fig. A represents an elementary generator with one loop cutting the maximum number of lines of force, and the maximum voltage being induced in the direction shown.

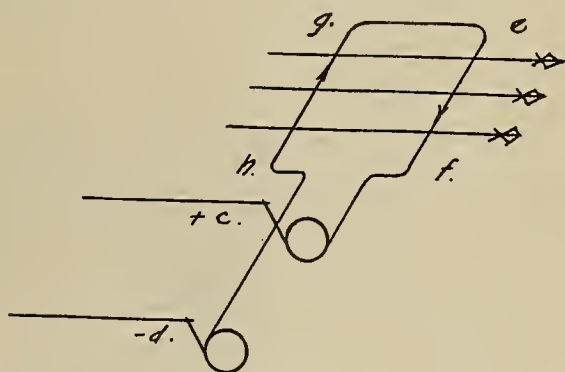


Fig. B.

When the loop has turned through an angle of 180° "c" has become the positive brush and "d" the negative, as in Fig. B.

first the case of Fig. A. Here we see an elementary generator with one loop and each end of the loop attached to a slip ring. Assume we have two poles with the lines of force in the direction 'ab.' Let the direction of rotation be clock wise. Right now the loop is cutting the maximum number of lines of force, and the maximum voltage is being induced in the direction shown. The brush 'd' is a positive brush, current going out; and the brush 'c' is a negative brush, current going in.

Now let us take the case of this loop at right angles to the lines of force, 90° later. Here no lines of force are being cut, and consequently no voltage is generated.

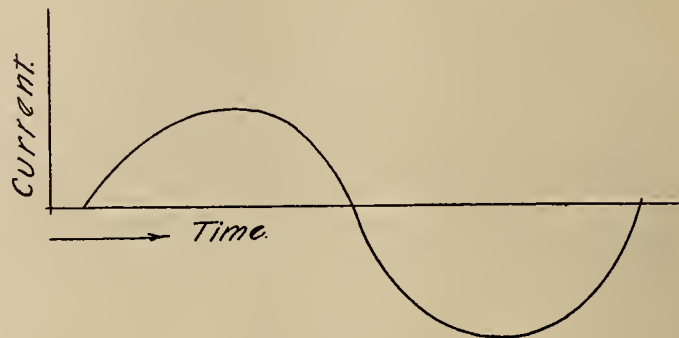


Fig C.

Diagram representing alternating current as produced in Figs. A and B, with "c" positive one-half of the time and "d" positive the other.

Let us go 90° more to Fig. B. Here 'c' has become the positive brush, and 'd' is now the negative brush. In other words, we are producing alternating current, for, half the time 'c' is positive and half the time 'd' is positive. Fig. C represents a picture of the current.

Now the question is, how are we to make direct or uni-directional current out of this? What we want is direct current on the line. We don't care

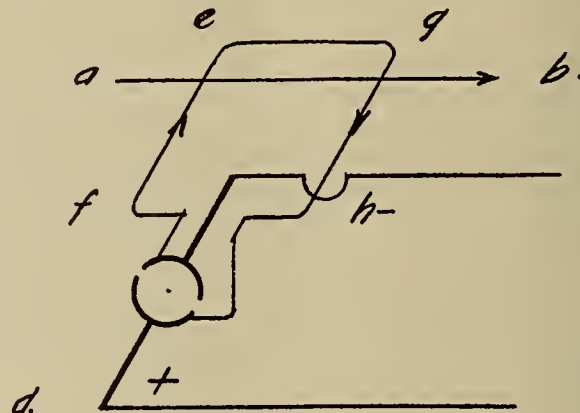


Fig. D.

Here the ends of the loop are connected to two segments of a single ring, each segment insulated from the other.

what happens inside the machine. Here is a way we could do this. Say we want brush 'c' negative and brush 'd' positive all the time.

If we could change brushes just at the time 'd' begins to get negative and change back again when 'd' is positive we could accomplish what we are after. This is exactly what a commutator does.

Let us look at Fig. D. Our loop is now connected to two segments of a single ring, each segment insulated from the other, and the brushes are placed, so that when the loop is not cutting any lines of force they will touch both segments. The

loop is in the same position as at Fig. A. Now let us see the loop at the position of Fig. B (Fig. E) and note if 'd' still remains positive and 'c' negative. (It might be said here that in a current-producing de-

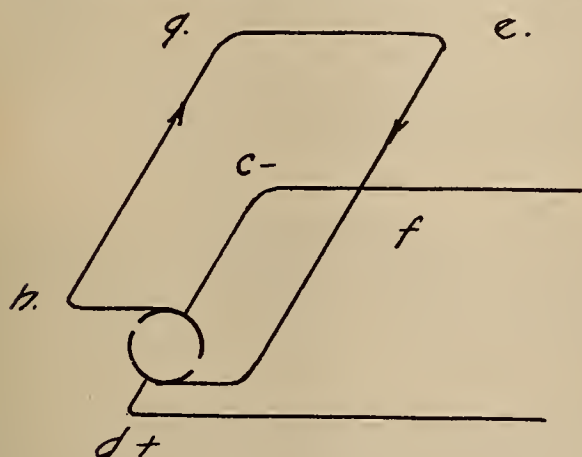


Fig. E.

The brushes are placed in such a way that when the loop is in the position of Fig. B, as here, "d" is still positive and "c" negative, so that direct current is being produced.

vice, the terminal out of which current flows is positive and the terminal into which it flows is negative.) We see that 'd' is still positive and 'c' is still negative. The alternating current has been commutated. What has been done is this: As soon as the current started to change in the loop, the brushes switched over to new ends of the coil. Consequently though the current changed direction in the loop, the current in the outside circuit did not. This is then the principle of commutation. Now our current loops as in Fig. F. The device which does the trick is the commutator, and brushes. The seg-



Fig. F.

Diagram of the current after the commutator has caused it to change direction in the loop, thus producing continuous current in one direction.

ments of the commutator must be insulated from each other and the brushes must change segments when the current is zero.

Essentials of Esperanto

BY W. R. DAINGERFIELD

(Judging from correspondence received in connection with our announced plan to devote a certain space to Esperanto, the electrical industry is taking a marked interest in this world commercial language. The first instalment of an Esperanto grammar is here presented in parallel columns. Judge W. R. Daingerfield, the author, is one of Esperanto's most able exponents.—The Editor.)

GRAMATIKO DE ESPERANTO

1. Ne estas esceptoj nek neregulaĵoj en la Lingvo Internacia.
2. La difina artikolo "the" (thi) estas la. Ne estas nedifina artikolo.
3. Adjektivoj finiĝas per a; derivitaj adverboj per e; infinitivoj per i; substantivoj per o; ordonaĵoj per u.
4. La simple-sonaj vokaloj estas tiuj de la germana, itala kaj hispana lingvoj; a kiel en "father"; e estas mezason inter la e de "met" kaj la a de "mate", sed sen la soneto de y malforte aŭdebla en "day"; i kiel en "machine" (maŝin), simila al ee en "see" (si); o kiel en "hot," ne estante la o in "note," kiu skribiĝus "noŭt" en Esperanto; u kiel oo en "food."
5. La akcento ĉiam estas sur la antaŭlasta silabo, kompreneble kun escepto de la unusilabaj vortoj.
6. Sonas j kiel la angla y. La pluraloj finiĝas per j. La diftongoj, aj, ej, oj, uj, aŭditaj en "aisle" (ajl), "day, toy, chop suey" (ĉop suj, ĥina bongustaĵo, simila al kuirita salato), estas kunmetaĵoj unusonaj kaj unusilabigaj de unu simpla vokalo kun la y. Simile la supersigneta ŭ kunmetiĝas kun a por formi aŭ, aŭdata en la anglaj vortoj "how, now"; kaj kun e por formi eŭ, kiu ne ekzistas en la angla, sed estas aŭdebla en la esperanta vorto "Eŭropo." La supersig-

ESPERANTO GRAMMAR

1. There are no exceptions or irregularities in the International Language.
2. The definite article "the" is la. There is no indefinite article.
3. Adjectives end in a; derived adverbs, in e; infinitives, in i; nouns, in o; imperatives, in u.
4. The simple vowels are those of the German, Italian and Spanish languages: a as in "father"; e is about half-way between e in "met" and a in "mate," but without the y sound faintly heard in "day"; i as in "machine" (like ee in "see"); o as in "hot" (not the o of "note," which would be written "noŭt" in Esperanto); u like oo in "food."
5. The accent is always on the next to the last syllable, except, of course, in monosyllables.
6. J sounds like the English y. Plurals end in j. The diphthongs aj, ej, oj, uj, heard in "aisle, day, toy, chop suey," are combinations into one sound and syllable of the simple vowel and the y. Similarly the marked ŭ combines with a to form aŭ, heard in the English words "how, now"; and with e to form eŭ, which does not exist in English, but is heard in the Esperanto word "Eŭropo" (Europe). The mark over the ŭ shows that it is not a syllable, but that it

neto super la ŭ montras, ke ĝi ne estas silabo, sed kunfandiĝas kun la antaŭstaranta vokalo, formante unu solan sonon kaj silabon nomitan diftongo. Ekzemple la vorto "laŭ" (along with, according to) ritmas similsona al "now, how, cow" (kaŭ, bovino), sed "balau," havante nenian markon sur la u (ordonmodaĵo de "balai," tu ŝiŭp) estas elparolata "bah-lah-oo," kun forta akcento sur la "lah." La enmetitaj literoj h ne estas parolataj, sed montras nur, ke la sono de la a estu tiel, kiel en la vorto "father" (patro).

7. C estas ts; ĉ kiel ch en "church"; g kiel en "go"; ĝ kiel aŭdebla en "gem, jail"; h kiel en "hot"; ĥ kiel en la skota "loch" aŭ la germana "ach, ich"; j kiel y; ĵ kiel zh, aŭdebla en "pleasure, azure"; s ĉiam siblas, neniam zumas kiel la z; ŝ kiel sh en "shall."

8. B, d, f, k, l, m, n, p, t, v, z kiel en la angla. Ne estas q, w, x nek y. Oni trilas la r.

9. Verboj estantecaj finiĝas per -as; estintecaj per -is; estontecaj per -os. La kondiĉmodaj, signifantaj, ke la verba ago estas nur supozata, aŭ estas kondiĉigata depende de io alia, finiĝas per -us.

10. Participoj: Estanteca aktiva -ant-; estinteca -int-; estonteca -ont-. Estanteca pasiva -at-; estinteca -it-; estonteca -ot-.

11. Prepozicioj regas la nominativan kazon.

12. La akuzativa aŭ objektiva kazo de substantivoj, pronomoj kaj adjektivoj finiĝas per n. Kiam la tuta senco de verbo ne estas sciebla, sen tio, ke oni sciis la estulon aŭ estaĵon ricevantan aŭ suferantan la agon de la verbo, tiam la ricevanto-suferanto prenas finiĝon n, kaj tiam verbon oni nomas transitiva. La vorto montranta la diritan aĵon aŭ ulon respondas la demandon, Kiun? aŭ Kion? kun la verbo antaŭstariĝinta antaŭ tiu ĉi demandvorto, jene: "Mi amas lin." (Vi amas kiun? Respondo: Lin.) La "lin" do estas ricevanto de la ago am', kaj devas preni -n en Esperanto.

13. Dua rimedo por trovi la akuzativaĵon aŭ objekton aŭ komplementon de transitiva verbo,—jen tri samsencaĵoj,—kaj samtempe trovi, ĉu la ekzamenata verbo estas ja transitiva aŭ ne, estas vidi, ĉu la frazo koncerna estus renversebla kun la vorto "by" (baj, de) metita antaŭ la subjekton, kaj ĉu la supozata akuzativaĵo estus tiam uzebla, kiel subjekto, jene: Li estas amata de mi.

14. Se la verbo tiam ricevanton ne havas, oni nomas ĝin netransitiva; kiel, ŝi dormas; la hundo bojas; la suno leviĝas.

15. Estas detalaĵoj, kiuj povas modifi tion, kio estas dirata kaj dirota per tiuj ĉi alineoj, tamen la studanto nun ne bezonas rilati ilin.

16. La akuzativa -n estas ankaŭ utiligebla por montri direkton al io, en okazo se ago komenciĝas ekster io kaj finiĝas en aŭ sur aŭ apud ĝi, aŭ almenaŭ moviĝas en ĝia direkto; ekzemple, "La birdo flugas en la ĉambron," sed la frazo "La birdo flugas en la ĉambro," montras, ke la birdo plenumas la tutan flugadon interne de la ĉambro. "La hirundo flugis trans la riveron, ĉar trans la rivero estas aliaj hirundoj."

coalesces into the preceding vowel, forming one sound and syllable called a diphthong. Thus, the word "laŭ" (along with, according to) rhymes with "now, how, cow"; but "balau," with no mark over the u (the imperative of "balai," to sweep) is pronounced "bah-lah-oo," with a strong accent on the "lah." The inserted h's are not sounded, but merely show that the a sound must be like a in "father."

7. C is ts; ĉ is as ch in "church"; g as in "go"; ĝ as heard in "gem, jail"; h as in "hot"; ĥ as in the Scotch word "loch," or the German "ach, ich"; j as zh, heard in "pleasure, azure"; s is always hissing, never humming, like z; ŝ like sh in "shall."

8. B, d, f, k, l, m, n, p, t, v, z, as in English. There is no q, w, z or y. R is trilled.

9. Verbs in the present tense all end in -as; past tense, -is; future tense, -os. Conditional mode (signifying that the verbal act is merely supposed or is conditioned on something else), -us.

10. Participles: Present active, -ant-; past, -int-; future, -ont-; present passive, -at-; past, -it-; future, -ot-.

11. Prepositions govern the nominative case.

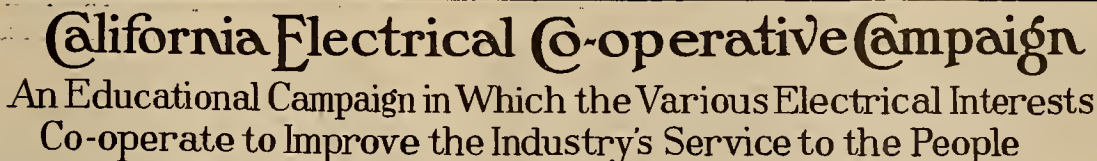
12. The accusative or objective case of nouns, pronouns and adjectives ends in n. When the full sense of a verb is not complete unless the person or thing that receives or suffers the action of the verb is known, the recipient takes n, and such a verb is called transitive. The word indicating the recipient answers the question Whom? Which? or What? preceded by the verb. Thus: "I love him." (Love whom? Answer: Love him.) "Him" is the recipient of the act "love," and takes -n in Esperanto, thus: "Mi amas lin."

13. Another way to determine the accusative or object or complement of a transitive verb—three names of the same thing—and at the same time determine whether the verb under scrutiny is transitive, is to see whether the sentence may be turned around with the word "by" in front of the subject, and whether the supposed accusative may then be used as a subject, thus: He is loved by me.

14. Where the verb has no such recipient it is called intransitive; as, She sleeps; the dog barks; the sun rises.

15. There are details that may qualify what is said and is to be said in these paragraphs, but the student is not concerned with them now.

16. The accusative -n is also used to show "direction towards," where some act begins outside of something, and finishes in or on or near it, or at least moves in its direction; thus, "The bird flies into the room" is "La birdo flugas en la ĉambron"; but "The bird flies in the room," that is, does all its flying while in the room, would be "La birdo flugas en la ĉambro." "The swallow flew across the river because across the river are other swallows" would be, "La hirundo flugis trans la riveron, ĉar trans la rivero estas aliaj hirundoj."



REPORT OF ADVISORY COMMITTEE FOR MONTH OF OCTOBER

The electrical section is becoming popular in California. It has been established in Los Angeles, and to some extent in San Francisco, San Diego,

Advertisements prepared by the California Electrical Cooperative Campaign and sent out to the electrical industry to promote the sale of electrical gifts at Christmas time.

Bakersfield, and Fresno. Arrangements have just been completed whereby the electrical section will be established over the system of the Southern

Please Use This Advertisement on the Date Shown, or Afterward, But Not Before.
If You Cannot Use It In Size Shown Here (4 Columns, 12 Inches), It
Can Be Set In Smaller Type (Six 2 Columns, 6 Inches).

California Electrical Cooperative Campaign
Advertisement No. 10—December 30, 1919

Looking Forward —1920

The year just ending has been a trying one for electric power companies due to uncontrollable conditions.

The third of a succession of dry years, steadily increasing costs of production and an abnormal demand for electricity are responsible for a shortage of power that is more regrettable to us, even, than to the prospective consumers themselves.

We wish to express our sincere appreciation of the understanding our consumers generally are gaining of our problems and our business practices.

We further wish to assure them we are doing everything within our power and our financial capabilities to relieve the present emergency situation by the construction of additional power generating facilities.

We truthfully say we are glad 1919 is behind us, and we are looking forward to 1920 with boundless hope and enthusiasm, expecting it to be a period of much constructive accomplishment.

We extend our most sincere wishes to everyone for a happy and prosperous New Year.

(SIGNATURE)

A New Year advertisement for the use of power companies, prepared by the California Electrical Cooperative Campaign.

California Edison Co., The San Joaquin Light and Power Corp., and the Pacific Gas and Electric Co. The Oakland dealers with the assistance of Mr. Jordan of the Pacific Gas and Electric Co., are at the present time formulating plans for an electrical section in Oakland.

Ten Thousand Pages of Electrical Advertising

BY MERREL E. HIXSON

(This authoritative article from the newly appointed director of cooperative advertising for the California Electrical Cooperative Campaign tells of the plans for the largest concerted advertising drive ever launched in the West. That it is being waged by the men of the electrical industry speaks much for their progressiveness and energy. All the electrical interests of the nation will be watching the success of the 1920 electrical advertising campaign in California.—The Editor.)

Not so long ago, less than three months, Howard W. Angus, secretary of the California Electrical Cooperative Campaign, was questioned at one of the meetings as to what number of full pages of electrical advertising it would be possible to obtain by waging a vigorous campaign to get the cooperation of the four branches of the electrical industry in order that full pages of electrical advertising and news matter attractively arranged could be put over in most of the daily papers of the State. Mr. Angus, to the surprise of almost everyone present, suggested that about six thousand pages during 1920 would be possible. Some of the more conservative present cut his estimate in half, while others laughed at such seemingly absurd assertions and even jokingly inquired if Mr. Angus had many such dreams.

Nevertheless, the six thousand page program is in full swing, what at first appeared the wildest of dreams is fast materializing, and Mr. Angus finds that the "Paul Reveres" of the California Electrical Cooperative Campaign who are passing the good word along to newspapers, contractor-dealers, jobbers, manufacturers, power companies and their employes, have raised his "ante of enthusiasm" and have set the mark at a ten thousand page program for the coming year.

One month from the day the Advertising Campaign idea originated, there had been an experienced advertising man employed to work in conjunction with the newspapers and individual members of the electrical industry, to sell them the idea as well as to plan a successful campaign in each and every town in the State large enough to support a newspaper. The news spread so rapidly that one month ahead of schedule a good percentage of the wide-awake papers were carrying full pages of electrical advertising and electrical news.

More Than 750 Pages Per Month —

At the present rate of progress, with the aid of the field representatives and members of the N. E. L. A. Publicity Committee, there will be about seven hundred and fifty full pages appearing monthly, carrying the messages of the electrical merchants and business-building news items. Trade Journals of the electrical industry and publications circulated among the newspapers of the West, realizing that the biggest educational advertising campaign ever launched in California, or any other state, was really under way and making good progress, spread the news broadcast.

It is a campaign new and novel, inasmuch as every business connected with the electrical industry

PRESS SERVICE OF THE PACIFIC COAST SECTION, N. E. L. A.

December 1, 1919

Publicity Committee, Fresno, California

Sell Interest in the Electrical Industry

SUGGESTIONS FOR USE

Electric Utilities in California

Better Lighting for the Home and Store

Public Policies Favorable to Electric Utilities

Effect of Coal Strike on Electrical Industry

Additional Railway Electrification

Boost the N. E. L. A. Membership Campaign—Write H. N. Sessions, Sec. Cal. Edison Co. L. A., for Blanks and Suggestions

Reproduction of the first news sheet sent out in connection with the new press service plan of the Pacific Coast Section N. E. L. A.

is a part of it—each doing, or to do, its part in waging the campaign in all communities, uniting the efforts to educate the public to greater uses of electricity and of electrical appliances. Some of the more progressive large city papers have advanced already from the one page idea to an electrical section to become a regular feature of the paper, comparing in size to the present day automobile section.

The California Electrical Cooperative Campaign and the electrical business interests are determined to place the industry foremost in the minds of the public, in the place that it should be, by consistent advertising and educational reading matter.

The newspapers that have had the opportunity to become acquainted with the Campaign's activities have taken an active part in building up the pages and have given their support in carrying out the work now under way. In most cases the editorial, news and business sections of the papers have cooperated to the fullest extent.

Increase of Journalistic Interest —

Heretofore some of the cosmopolitan newspapers were seemingly reluctant to give news mention of the vast projects now under way or recently completed, which are playing a major part in the development of the agricultural and manufacturing possibilities of the State. With the concentrated efforts of the organizers of the Campaign, all the newspapers of the State are coming to fully realize the vast importance of the hydro-electric development now under way, and are lending every effort to make known the future possibilities that such projects, when completed, will open to home seekers and manufacturers who, of recent years, have been handicapped by the lack of power.

The greater the development of power, the sooner the wealth of the State will increase. The added developments will benefit every branch of the electrical industry, making good the shortage of power which in some parts of the State has limited the sale of appliances for the home, factory, store and farm. The development of the now idle land of the State, thus brought about, means a larger population to the cities adjoining and increased wealth to the entire State.

Education of Public and Press —

The interest of the newspapers has largely been aroused through the activities of the California Electrical Cooperative Campaign in its efforts to gain the cooperation of the newspapers in waging the ten thousand page advertising campaign for 1920.

The newspaper men, like the general public, were not thoroughly posted as to how much the future development of the State really depends upon electrical energy, nor as to the hundreds of ways in which electricity is applied for the benefit of mankind today.

The success of the Campaign will depend upon the contractor-dealers to a large extent, in their willingness to tie-in with the power companies' educational advertisements that will appear regularly in each paper of the State, to be run in conjunction

with the California Electrical Cooperative Campaign program. The contractor-dealer is not being asked to do anything other than build his own business by conservative advertising that will bring immediate returns. It is wholesome publicity that will place the electrical merchandising business on a sound footing with the people.

Books and Bulletins

The Romance of a Great Factory

"The Romance of a Great Factory" by C. M. Ripley is a book which opens up new lines of thought. It deals with electrical subjects—especially the contributions made by the Schenectady Works of the General Electric Company, which employs nearly twenty-five thousand men. It portrays the romantic human interest side of present day electrical industry, describing the curious, spectacular and sentimental aspects of the life, achievements, work and play of those employed in the big industrial plant. The book contains a 1000-word introduction by Dr. Chas. P. Steinnetz, together with 100 illustrations, photographs and artists' drawings of electrical scenes in and out of the shop. It is published by the Gazette Press, Schenectady, N. Y., price \$2.00.

Irrigation in Montana

An exceptionally interesting booklet entitled "How to Create an Irrigation District in Montana" has been issued by the Montana Irrigation Commission, Daniel Boyle, J. E. McCormick, Lee Dennis and W. J. Haynes. The Irrigation Commission came into being under a recent Irrigation District Law passed by the Montana legislature, and the booklet in question aims to give publicity to the new conditions created by this law, and the possibilities of development. It quotes at length from the water right and irrigation laws of the State and supplies a large amount of valuable information for those interested in irrigation matters. A number of excellent photographs make the booklet attractive as well as useful.

Bureau of Mines

The following Technical Papers have been issued recently by the Bureau of Mines:

- 210. An Analytical Method for Detecting Blown-out Shots in Coal Mines. By G. F. Hutchinson and Jacob Barab.
- 231. Production of Explosives in the United States During the Calendar Year 1918, with notes on coal-mine accidents due to explosives, and list of permissible explosives tested prior to March 31, 1919. Compiled by Albert H. Fay.
- 234. Sensitiveness of Explosives to Frictional Impact. By S. P. Howell.
- 236. Abatement of Corrosion in Central Heating Systems. By F. N. Speller.
- 237. Safe Practice in Using Wire Ropes in Mines. By R. H. Kudlich and O. P. Hood.
- 239. Coke-Oven Accidents in the United States During the Calendar Year 1918. Compiled by Albert H. Fay.
- 242. Why and How Coke Should be Used for Domestic Heating. By Henry Kreisinger and A. C. Fieldner.

The Monthly Statement of Coal Mine Fatalities in the United States for August, 1919, compiled by Albert H. Fay, has also been published.

Catalogues

A neat and effective catalogue recently sent out by the Ohio Brass Company of Mansfield, Ohio, features Imperial Incandescent Headlights for Electrical Traction and Mining Service.

The Hotpoint division of the Edison Electrical Appliance Company issues a new catalogue of electrical appliances, with full details concerning each article illustrated.

Frederick J. Drake & Co., of 1006 Michigan Ave., Chicago, publish a catalogue including a large number of practical technical books.

SPARKS—Current Facts, Figures and Fancy

(Salvaging wrecks, heating water for industrial purposes, and drilling oil wells are among the most recent functions effectively performed by electricity. How to keep your crops safe at night, how to make bad fuel good, and where to live to avoid thunderstorms may also be learned here.—The Editor.)

Flood lighting is being used by a company in Southern California to keep ducks and geese away from crops at night.

* * *

In a recent report on the first completion of an oil well by electricity the engineer stated that he saved \$3,655.20 by using electricity rather than steam.

* * *

Vertical searchlight beams arranged in different combinations are being used by the British air ministry to enable belated airplanes to locate their airdromes after dusk.

* * *

The petroleum industry uses millions of dollars' worth of electrical supplies every year. Among other things oil fields demand a network of telegraph and telephone wires.

* * *

The Pacific Coast of the United States is the most free of electric storms of any part of the country. The average number of thunderstorms at San Francisco is less than one per year. The average in the Gulf States is about 94.

* * *

A recently published report of an Eastern telephone and telegraph company states that slipping on stairs causes 34 per cent of all its accidents among women, and improper use of tools caused over 16 per cent of accidents among men.

* * *

An item in the peace treaty provides that "the Germans shall reconstruct parts of French territory which they maliciously destroyed during the war." It is reported that when the Germans took up the work the French labor unions objected to "cheap foreign labor" and demanded that the German workmen receive the same wages as themselves.

* * *

A plan to utilize the difference in level between the Mediterranean and the Dead Sea for the development of hydroelectric power, has recently been brought forward. A tunnel 37 miles long from the Dead Sea valley would give a drop of 1295 feet for power generation. The power would be used for lighting and industrial purposes in the Holy Land, and to pump water from Lake Genezareth to irrigate the Jordan Valley and the plain of Sharon. It is claimed that with regulating dams at Genezareth, there is enough water to irrigate several hundred thousand acres.

A Red Cross worker in Rumania evolved a new kind of fuel recently. Wood and coal have been exceedingly scarce in Rumania since the war, and the only fuel available to the relief man was a very low grade lignite which hardly burned at all. Finding some of the rivers thickly encrusted with oil scum, he conceived the idea of skimming this off the surface of a stagnant pool and soaking the lignite briquettes in it for a day or two. The result was a fuel which burned with a most satisfactory roar.

* * *

Heating water electrically for industrial and commercial purposes has been shown to be economical by the workings of a recently designed apparatus. This takes 3 kw., and is provided with a thermostat, by which the current is interrupted when the water reaches a given temperature. The average daily consumption in a given year was 15.4 units, and the maximum consumption on any one day 22 units, and the average number of hours of use per day about 6 hours. Electrical heating for water is of special importance in areas supplied by long-distance transmission.

* * *

A new method of attaching wire hawsers to the hulls of sunken vessels, where a diver cannot pass them under, is the limpet system. The limpet is a soft iron body, carrying a number of drill taps driven by small motors, the current being supplied from the salvage vessel. The limpet is lowered until it comes in contact with the hull of the vessel, when it is magnetized, causing it to cling to the plates. The drills are then started, and after running a predetermined length of time the current is switched off, the limpet is hauled to the surface, and the drills are left tightly fastened in the ship's hull. The ends of these drills are formed into eyes, to which the hawsers can be attached.

* * *

Flying kites is a popular sport with the Weather Bureau, though in justice to this serious-minded body let it be added that their motives are not as juvenile as the pastime would seem to indicate. Box kites are used for the purpose of studying atmospheric conditions far aloft. The "string" is piano wire unwound from a fixed reel. Every now and then lightning hits the wire and the latter disappears in what appears like a streak of rusty smoke. The kite-flyers would run great risks were it not that they take adequate precautions. Instruments used in connection with the apparatus frequently indicate a high voltage, and a small spark-gap would show an almost constant flow of current from kite and wire through the reel to the ground.

PERSONALS

E. C. Hutchinson, chief engineer with the Pelton Water Wheel Company, San Francisco, and an authority in water wheel design, has been elected president of the San Francisco Engineers' Club. This organization has meant much in the life of the local engineering community, not only providing a convenient meeting place for societies and committees, but being an important influence in unifying the profession. Here all problems of engineering interest come up for discussion at one time or another and receive the benefit of an exchange of opinion.



The past year has been a most successful one under the leadership of A. E. Chandler, and the club looks forward to enlarged activities under the able leadership of Mr. Hutchinson.

A. B. West, electrical engineer of Riverside, Cal., is among recent visitors to San Francisco.

George Boring, manager of the Pacific States Electric Company, Portland, spent two days in Seattle recently while enroute to Spokane.

R. F. Oakes of the National Carbon Company, San Francisco, has returned from the East where he has been making a business visit to New York.

Samuel Graff, president of the Seward Light & Power Company, Seward, Alaska, is spending a few weeks in the States, arriving in Seattle November 30.

O. P. Hood, chief mechanical engineer of the U. S. Bureau of Mines, with headquarters in Washington, visited the San Francisco office of the Bureau during November.

Allyn G. Smith, who was graduated from the College of Electrical Engineering, University of California, in 1916, is in charge of the Radio School of the Army Air Service at Kelly Field, Texas.

H. McR. Jones, engineer with the Westinghouse Electrical and Manufacturing Company, who has been in the Orient on business, spent some time in San Francisco on his way back to his home in Toledo.

John M. Nicol, mining engineer for many years resident in Mexico and Central America, addressed the Foreign Trade Club of San Francisco, December 10th, on "Mexico—Its People and Problems."

G. E. Quinan, chief engineer Puget Sound Traction, Light & Power Company, Seattle, is attending the meeting of the Code Committee of the National Electric Light Association at Denver, Colorado.

J. I. Colwell, manager of the Western Electric Company, Seattle, left on December 1st for a two weeks' trip into California, taking in San Francisco and the electrical supply jobbers convention at Del Monte.

Prof. Dr. Y. Furuya of the electrical engineering department of Kiushiu University, Japan, is visiting the United States on a tour of inspection, studying water power development. He has recently been spending some time on the Pacific Coast.

H. L. Bargion of the Washington Supply Company represented Spokane and Harry Byrne of the North Coast Electric Company represented Seattle among the jobbers who recently convened at Del Monte for their quarterly convention and golf meet.

D. O'Hara and A. L. Shaw have been released from the service and announce the resumption of practice as consulting engineers, specializing in investigation, design, supervision, and industrial and power developments. Their offices are in the Phelan Building, San Francisco.

Cheng Wen Chih, representative of the China Industrial Committee, arrived recently in San Francisco, from where he will start on a tour of the United States, visiting large industrial plants and investigating industrial conditions, especially the lighting and power systems.

Ralph P. Clapp, President of the Electrical Cooperative League of Los Angeles, was a guest at the December 8th luncheon meeting of the San Francisco Electrical Development League in the Palace Hotel. Mr. Clapp spoke a few words of greeting from the electrical men of the Southland.

J. P. Davis, purchasing agent of the Belden Manufacturing Company, has been elected president of the Purchasing Agents Association of Chicago. Mr. Davis was formerly assistant purchasing agent for the Standard Underground Cable Company, of Pittsburgh, coming with the Belden Manufacturing Company as purchasing agent in 1916.

Arven Polhemus, who during the war was lieutenant in the Air Service Radio Section, is now engaged in electrical experimental work in the Standard Oil refinery at Richmond, Cal. He has been studying especially the mitigation of electrolytic corrosion. Mr. Polhemus is also associated in an advisory capacity with the Technical Service Company, 282 Monadnock Building, San Francisco, who specialize in technical advice to inventors.

A. Y. Tuel, pioneer in transpacific radio communication and a well-known wireless expert, has left the Navy radio service to return to the Federal Telegraph Company as division chief operator. Enlisting six days after the declaration of war, Lieutenant Tuel served as assistant to the Pacific Coast communication superintendent, U. S. N., and has actively assisted in the maintenance and extension of transpacific radio service under war conditions.

Dr. Elwood Mead, professor of rural institutions at the University of California and a specialist on irrigation problems, has been appointed by Secretary of the Interior Franklin K. Lane to act as one of the Council of National Progress. The purpose of this council is to make a study of policies and plans which should be followed in national development. The electrical industry is especially represented on this body by Theodore N. Vail, president of the American Telephone and Telegraph Company.

Daniel C. Jackling, financier and director of great copper mines and power interests, has been awarded the

Distinguished Service Medal by Congress "for exceptionally meritorious and distinguished service as director of the United States Government explosive plants during the war." This patriotic work he began in 1917. Mr. Jackling is intimately connected with the electrical industry as President of the Utah Power and Light Company. He is vice-president and managing director of several large mining corporations,



including the Utah Copper Company, Ray Consolidated Copper Company, Chino Copper Company, Nevada Consolidated Copper Company, Butte and Superior Mining Company, Alaska Gold Mines Company, and others. Mr. Jackling is at present in New York City but will return before Christmas to San Francisco, where he has offices in the Hobart Building.

Herbert C. Hoover, who has been spending some time in resting at his Palo Alto home, has returned to public life.



He has recently been appointed by the President to the new industrial commission, which is to consider and report on the labor situation. This comes as a gratifying response to the efforts of the Engineering Societies to secure the appointment of an engineer on this commission. Mr. Hoover is also slated to be the next president of the American Institute of Mining and Metallurgical Engineers.

J. G. Pomeroy of Los Angeles has been calling on his electrical friends in San Francisco.

H. M. Littell, electrical engineer of Los Angeles, recently spent some days in San Francisco.

A. H. Naftzger, member of the Industrial Accident Commission, Los Angeles, has recently visited San Francisco.

J. H. Wiggins, assistant engineer of the Bartlesville station of the U. S. Bureau of Mines, is at present in the San Francisco office engaged in work relating to evaporation losses of oil in storage.

Floyd Averill of the Fobes Supply Company, Portland, was one of the two Portland representatives at the Del Monte convention of Electrical Supply Jobbers which took place early in December.

John Lewis, engineer manager of the Warm Springs Irrigation project, Oregon, and formerly State engineer, has resigned, and will establish an office in Portland where he will practice and make his home.

H. D. Randall of the Capital Electric Company and C. B. Hawley of the Intermountain Electrical Supply Company came all the way from Salt Lake City to attend the recent Jobbers' Convention at Del Monte.

Chas. H. Merz of Merz and McLelland, consulting engineers of London, was a recent visitor in San Francisco. He has just completed an investigation of railway electrification in Australia and is now returning to England.

M. J. Gavin, refinery engineer, U. S. Bureau of Mines, with headquarters at the Salt Lake Station of the Bureau, who is in charge of the Bureau's investigations relating to oil shale, spent a week during November at the San Francisco office of the Bureau.

J. B. Fiskien, president of the Northwest Electric Light & Power Association, attended the meeting of the Inductive Interference and Overhead Systems Committee of the National Electric Light Association held in Denver on Dec. 1st, 2nd and 3rd.

C. F. Parker, for the last 10 years an inspector with the Department of Electricity, San Francisco, has been elected manager of Meyers Electric Safety Switch Co. and commencing January first will devote his entire time to the interests of that company.

C. R. Scudder of St. Louis recently passed through San Francisco on his way back from Alaska, where he spent the last five months hunting big game. He was caught by the winter and made a seven hundred mile dog sled trip to get out. His entire experience has been in the nature of a Big Adventure, with many a story of exciting escapades.

Guy W. Talbot, president of the Pacific Power and Light Company of Portland, and also of the Portland Gas & Coke Company, arrived home recently after a visit to New York and other Eastern points. During his stay Mr. Talbot was obliged to undergo an operation, performed in Chicago, and has returned home to complete his convalescence.

F. D. Weber, vice-president of the State Board of Engineering Examiners, made a business trip to Eugene during the past week.

Bob Stubbs of Stubbs Electric Company, Portland, was one of the popular visitors at the recent convention of the Pacific Coast Division, Electrical Supply Jobbers at Del Monte.

A. L. Powell, Illuminating Engineer in the laboratory of the Edison Lamp Works, Harrison, N. J., delivered a very interesting illustrated lecture before the Utah Section of the American Institute of Electrical Engineers in Salt Lake City on November 26. Mr. Powell discussed in an able manner the various phases of industrial, store and residence lighting.

John A. Britton, vice president and general manager of the Pacific Gas and Electric Company, has recently undertaken a trip of inspection of the Lake Spaulding and subsidiary dams, accompanied by P. M. Downing, chief engineer of the company. In order to meet the increased demand for power in the valley agricultural regions, it has been found necessary to enlarge this dam, and the trip was an inspection of this work.

Russell W. Stovel, who recently returned from France, where, as Lieutenant-Colonel of Engineers, he served as Chief of the Terminal Facilities Division of the Army Transport Service, has been appointed a consulting engineer of Westinghouse, Church, Kerr and Company, Inc., and as a member of that organization will devote his entire time to the company's electrical and mechanical work. Mr. Stovel has had an unusually comprehensive experience in the electrical and mechanical problems connected with central power station and steam rail-



road electrification work, together with a most valuable experience in mechanical handling at docks and terminals. In 1914 Mr. Stovel left Westinghouse, Church, Kerr & Company to become managing engineer for Gibbs and Hill, consulting engineers, of New York. In France Lieutenant-Colonel Stovel served as electrical and mechanical engineer in charge of the Pier Utilities Branch of the Terminal Facilities Division, and later as Chief of the Terminal Facilities Division in charge of all matters relating to the procurement, maintenance and operation of all terminal facilities under the jurisdiction of the Army Transport Service.

OBITUARY

Robert A. Faries, founder and president of the Faries Manufacturing Company of Decatur, Ill., died on Monday, November 17th. Mr. Faries was known not only as the able head of a large firm but also as an inventor. He was one of the first men to devise adjustable fixtures for electric lights, making it possible to move lights from one position to another and yet have some stability in their position.

When check-rowing corn planters were instituted he invented a machine to make and fasten the wire links. A type of steam boiler was also among his patents.

In addition to his national reputation Mr. Faries held a distinctive and personal place in his own community, and his death is deeply mourned by many friends and admirers.

A. R. Fuller, who recently joined the sales force of the Western Electric Company, San Francisco, died on December 9th of heart disease. Mr. Fuller was formerly manager of the Stewart Fuller Company of San Francisco.

William Allen Brown, for sixteen years secretary and chief financial officer of the Waelark Wire Company, New York City, died on Monday, Nov. 10th.

Meeting Notices for Electrical Men

(Del Monte has been the scene of a number of important meetings during the past two weeks, including that of the Electrical Supply Jobbers and of several N. E. L. A. committees. In San Francisco engineering societies and the Contractor Dealer Association have held well-attended gatherings, while interesting meetings are also reported from the Northwest and the Inter-mountain district.—The Editor.)

N. E. L. A. Committee Meetings

Commercial Committee —

On Dec. 3rd a meeting of the Commercial Committee, Pacific Coast Section of the National Electric Light Association, was held at Del Monte, the following members being present: K. E. Van Kuran, chairman; R. A. Balzari; J. O. Case; A. W. Childs; H. H. Courtwright; F. D. Fagan; R. E. Fisher; C. B. Hall; A. H. Halloran; D. E. Harris; C. R. Hunt; M. L. Scobey; A. E. Wishon; Garnett Young. Present as invited guests were R. M. Alvord; Howard Angus; T. E. Bibbins; M. A. De Lew; W. R. Dunbar; J. T. Jameson.

Papers were read by Garnett Young on "How the Electrical Industry Should Cooperate With the Architect and Home Builder;" and by C. R. Hunt on "The Fifty Degree Motor Equipment in Relation to the Central Station." F. D. Fagan read an outline of his proposed paper on "The Value of Proper Illumination," and preliminary data was presented by J. O. Case on "Unelectrified Horsepower."

The chairman announced the appointment of R. E. Fisher as chairman of the sub-committee to prepare the paper on "Central Station Power vs. Gas Engines," instead of Carl Johnson, who will be unable to prepare such a paper on account of his protracted absence from the coast.

A committee to gather opinions from the industry regarding the possibility of rating motors on the basis of kilowatt input, was appointed as follows: R. A. Balzari; J. O. Case; Carl Johnson; A. W. Childs; R. E. Fisher; A. E. Holloway; E. B. Criddle; E. B. Walthal; C. R. Hunt; Geo. N. Rooker.

The next meeting of the commercial committee will be held about the middle of January.

Executive Committee —

A special meeting of the Executive Committee of the Pacific Coast Section of the National Electric Light Association was held at Del Monte on December 5th, the following members being present: President A. E. Wishon; L. H. Newbert; C. C. Hillis; S. M. Kennedy; E. O. Shreve; A. B. West; A. H. Halloran. Present by invitation were John A. Britton, chairman Public Policy Committee; T. E. Bibbins, chairman Committee on Cooperation; I. W. Alexander, chairman Publicity Committee; P. R. Ferguson, chairman Accounting Committee; K. E. Van Kuran, chairman Commercial Committee; H. N. Sessions, chairman Membership Committee; Garnett Young.

The meeting opened with a discussion of convention plans for the Pacific Coast Section, the consensus of opinion being that the most practicable time and place for the convention was May 7th to 16th at Pasadena. This was provisionally accepted.

A report was presented by Secretary A. H. Halloran showing action taken and results secured on all resolutions adopted at the Coronado convention.

I. W. Alexander reported on the activities of the Publicity Committee, and displayed copies of the first Press Service Bulletin.

H. N. Sessions of the Membership Committee, made an appeal for the active support of company heads in stimulating interest in N. E. L. A. membership. P. R. Ferguson presented a report of the Accounting Committee's activities, and K. E. Van Kuran on the Commercial Committee. Arrangements were made to secure widespread national publicity for the material in Garnett Young's paper on "How the Electrical Industry Should Cooperate with the Architect and Home Builder." The Section pledged its active support for the enforcement of the California Industrial Accident Commission's "Lighting Code" and "Electrical Utilization Safety Orders."

National Electric Light Association Meetings in Denver

On December 1st, 2nd and 3rd the Committee on Overhead Lines and the Committee on Inductive Interference met in Denver, Colorado.

The Pacific Coast Section was represented by

Messrs. L. M. Klauber, R. E. Cunningham and J. E. Woodbridge. The Northwest Electric Light & Power Association was represented by Messrs. G. E. Quinan, J. B. Fiskien, L. T. Merwin and H. R. Wakeman.

The Inductive Interference Committee devoted much of its time to a review of the situation in California as affected by the General Order of the Railway Commissioner of that State. The sub-committees on current problems and on data, bibliography, etc., perfected their programs and advanced their work.

One point of interest to Western engineers in the work of the Overhead Lines Committee was the endorsement by this committee of research work on the deterioration of porcelain insulators.

The meetings of the two committees closed with a trip over Lookout Mountain, given by the officers of the Denver Gas & Electric Company.

BUILDERS OF THE WEST — LXVII



LIEUTENANT-COLONEL E. J. HALL

"America's most distinctive contribution to the war in the air," is the tribute paid by Benedict Crowell, Director of Munitions, to the Liberty Engine. To a practical engineer of the West, E. J. Hall of the Hall-Scott motor works of Berkeley, California, is due a large share of the credit for perfecting this typically American aircraft engine. Together with J. C. Vincent of the engineering staff of the Packard Motor Car Company he laid out the plans and undertook the actual work of development. With infinite skill he combined in its design the best elements from a score of sources, and the final successful product was capable of great quantity production. No technical achievement of the whole war ranks higher than the Liberty Engine. To Lieutenant-Colonel E. J. Hall, Air Service, U. S. A., one of its chief designers, this issue of the Journal of Electricity is affectionately dedicated.

San Francisco Electrical Development League

On "Electrical Retailers' Day" at the League, December 1st, J. C. Hobrecht of Sacramento talked on "How the Electrical Dealer Looks Upon the Present and Future of the Retailing of Electrical Goods." Mr. Hobrecht emphasized the necessity of building up a definite merchandising policy, and strongly urged that electrical dealers enter more extensively into advertising. He estimated that at least 2½ per cent of a dealer's total annual outlay should be spent on advertising and publicity in the proper mediums. W. D. Kohlwey, as chairman of the day, introduced the speaker.

The meeting of December 8th was one of the best-attended of the year. Commander Bryson Bruce, U. S. N., engineer officer in charge of the installation of electrical machinery on U. S. S. "California" at Mare Island Navy Yard, spoke on "Electric Propulsion of Ships." Commander Bruce described the equipment of electrically driven battleships, especially the "California," which he termed "the crowning achievement of the application of electricity on board ship." Wilfred Sykes, in charge of the application of electricity to ship propulsion for the Westinghouse Electrical and Manufacturing Company, Pittsburgh, was present as a guest and spoke a few words on the adoption of the electrical drive by the Navy Department. Representatives of the U. S. Shipping Board and of the leading shipbuilding yards about San Francisco Bay were at the meeting by special invitation. Aubrey Drury, associate editor of the Journal of Electricity, acted as chairman of the day.

Northwest Electric Light & Power Association

The new officers of the Northwest Electric Light & Power Association are as follows:

John B. Fiske, president, Seattle, Washington.
F. D. Nims, vice-president for Washington, Seattle, Washington.
George L. Myers, vice-president for Oregon, Portland, Oregon.
W. R. Putnam, vice-president for Idaho, Boise, Idaho.
F. M. Kerr, vice-president for Montana, Butte, Montana.
L. A. Lewis, secretary and treasurer, Spokane, Washington.

The Executive Committee of the Northwestern Electric Light & Power Association met in Portland on Nov. 26th, for consideration of matters of general nature, especially the representation of the Association at the Pasadena Convention and the question of proper organization of sections, accounting, commercial public relations, hydroelectric and technical sections scope, defining their duties and work, and the consideration of appointment of the Governing Committee of each Section. The question of effecting closer co-operation with contractors, dealers and jobbers, and manufacturers was discussed, and the Association will name an Advisory Committee from the personnel of the Governing Committee of the Commercial Section to work out the problem of co-operation. The Advisory Committee will be so chosen that it will also include representatives of the contractors, dealers, jobbers and manufacturers.

The Public Policy Committee of the Association met Nov. 25 at the call of the president, but on account of the lack of a quorum, the meeting adjourned probably to meet again after the first of the year.

The Public Policy Committee of Oregon met Tuesday, Nov. 25, and organized and elected a chairman for the year and considered matters of public policy affecting Oregon.

The following members have been appointed as the Governing Committee of the Hydroelectric and Technical Committee of the Northwest Electric Light & Power Association:

For Three Years

G. E. Quinan (chairman), Puget Sound T. L. & P. Co., Seattle;
W. H. Trenner, Idaho Power Co., Boise;
R. M. Boykin, North Coast Power Co., Portland.

For Two Years

H. L. Walther, California-Oregon Power Co., Medford;
H. R. Wakeman, Portland R. L. & P. Co., Portland;
H. H. Schoolfield, Pacific Power & Light Co., Portland.

For One Year

J. B. Fiske, Washington Water Power Co., Spokane;
L. T. Merwin, Northwestern Electric Co., Portland;
F. D. Nims, Washington Coast Utilities, Seattle.

The following members have been appointed on the Public Policy Committee of the same association by President Fiske:

G. C. Pierce, president, Northwestern Electric Company; G. W. Talbot, president, Pacific Power & Light Company; F. F. Griffith, president, Portland Railway Light & Power Company (chairman); A. W. Leonard, president, Puget Sound T. L. & P. Co.; George L. Meyers, Pacific P. & L. Co.; W. R. Putnam, Idaho Power Company; F. M. Kerr, Montana Power Company; F. D. Nims, Washington Coast Utilities; F. F. Johnson, president, Idaho Power Company.

The following members have been appointed on the Public Policy Committee for Oregon:

R. M. Boykin, vice-president and general manager, North Coast Power Company; A. B. Bower, manager, Condon Electric Company; C. M. Brewer, vice-president and general manager, Mountain States Power Company; C. J. Edwards, president, Coast Power Company; T. H. Foley, vice-president and manager, Bend Water, Light & Power Company; O. B. Frank, manager, Douglas County Light & Water Company; H. V. Gates, Hillsboro Power & Investment Company; J. P. Lottridge, manager, Eastern Oregon Light & Power Company; L. P. Lumpee, manager, Vale Electric Company; H. F. McCormick, manager, St. Helens Light & Power Company; R. J. Moore, president, Yamhill Electric Company; J. F. Orr, district manager, Idaho Power Company; Guy C. Pierce, vice-president and general manager, Northwestern Electric Company; E. G. Robinson, president, Molalla Electric Company; H. J. Rowe, general manager, Stayton Light & Power Company; C. M. Shinn, vice-president and manager, Cottage Grove Electric Company; J. T. Thompson, manager, Sheridan Light & Power Company; R. M. Townsend, Portland Railway, Light & Power Company; H. L. Walther, general superintendent, California-Oregon Power Company; George L. Meyers (chairman), Pacific Power & Light Company.

American Association of Engineers

At the annual meeting of the San Francisco Chapter of the American Association of Engineers William S. Wollner was unanimously elected to the presidency of the chapter for the coming year. Prior to the announcement of the result of the election, the retiring president, J. H. Knowles, presented his report of the activities of the association during the past year, which was supplemented by reports of Secretary A. G. Mott and Treasurer A. R. West telling of the remarkable growth of the chapter during the year and the excellent state of its treasury.

In a spirited election, J. F. Johnston was elected first vice-president; W. H. Phelps, second vice-president; L. R. Kessing, treasurer, and A. G. Mott, secretary. Mr. Wollner, in accepting the presidency, outlined the plan he believed the association should follow in assuming the obligation that the engineer owes to the community. He stated that the American Association of Engineers is ideally fitted to participate in the presentation and solution of problems that are vital to the community, the commonwealth and the nation.

Electrical Engineers Meet

At the meeting of the Seattle Section of the American Institute of Electrical Engineers held on November 17, the session was entirely taken up with listening to an address by Dr. F. B. Jewett, chief engineer of the Western Electric Company, New York. His address related to means of communication during the war by the Allies, both on the battle-front and in naval operations. He took up the means for telegraph and telephone communication, also radio-telephony as developed on naval ships and on the battle front. He spoke of the success of apparatus on airplanes whereby aviators could communicate with each other in the air as well as with stations on the ground. All new apparatus was illustrated by lantern slides, and in closing he devoted some time to moving pictures involving operations in the battle-fields. The process of locating heavy guns by sound waves was described and illustrated.

Engineers' Club of San Francisco

At a special meeting of the Engineers' Club of San Francisco, in the club rooms in the Mechanics Institute Building, Thursday afternoon, December 4th, M. M. O'Shaughnessy, City Engineer of San Francisco, gave an interesting talk on the "Hetch-Hetchy Power Project." Illustrative of the topic, Mr. O'Shaughnessy displayed three reels of moving pictures showing construction work under way at Hetch Hetchy, Lake Eleanor, and in various shafts and tunnels connected with the project. The membership gave the speaker a vote of thanks at the conclusion of his address.

Electrical Supply Jobbers' Association

The meeting of the Electrical Supply Jobbers at Del Monte was well attended, and the golf tournament played off with the customary enthusiasm.

C. B. Hawley again won the honor of having his name placed on the old copper cup in the Jobbers' match.

The Pass & Seymour cup, after five years or more of hard-fought competition, finally passes to C. C. Hillis for permanent possession.

The conditions of play for this cup required that it must be won three times before becoming the permanent trophy of the winner. The many times it has passed through the engraver's hands makes it a valuable and interesting trophy of the game.

Mr. Hillis also succeeded in having his name placed on the Turner trophy for the second time.

The Central Station cup was won by A. Emory Wishon, president of the Pacific Coast Section of the N. E. L. A. While his experience in the game of golf does not equal that of Mr. Hillis and others, he bids fair to be a strong contender for trophies.

The Manufacturers' cup, presented by the Jobbers, was won by R. A. Balzari of the Westinghouse Company.

Dr. Jewett Speaks in Los Angeles

Dr. Frank B. Jewett, chief engineer Western Electric Company, and during the war lieutenant-colonel in the Signal Corps, U. S. A., delivered two lectures in Los Angeles in the first week of December, under the auspices of the American Institute of Electrical Engineers. His subject was "Some War-Time Developments in Electrical Communication and Allied Fields." On Tuesday evening, December 2nd, he gave a talk on this topic at a "popular meeting" in the auditorium of the Los Angeles Polytechnic High School. A "technical meeting," devoted particularly to a discussion of the technical features of the same subject, was held on Friday evening, December 5th, in Choral Hall. Both meetings were well attended. Participating were the local sections of the American Chemical Society, American Institute of Architects, American Institute of Mining Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, Engineers and Architects Association, National Electric Light Association, Electric Cooperative League, the Synchronous Club and Academy of Sciences.

Portland Sections, A. I. E. E. and N. E. L. A.

At the regular monthly meeting of the Portland sections, American Institute of Electrical Engineers and National Electric Light Association, on Tuesday evening, December 9th, a discussion of "Central Station Steam Heating Problems" was given by O. L. LeFever and A. D. Leach of the Northwestern Electric Company. Lantern slides were used to illustrate the subject. Refreshments were served at the meeting, which was held in the auditorium of the University Club, Portland.

Advisory Committee, California Electrical Cooperative Campaign

The advisory committee, California Electrical Cooperative Campaign, met at Hotel Del Monte on Tuesday, December 2nd. Important matters relating to the progress of the campaign were discussed, especial attention being paid to advertising. Full consideration was given to the plan now being put into successful operation all over the State, involving the organization of special electrical advertising pages and sections in daily and weekly newspapers. The necessity of securing adequate and telling news items was emphasized, and valuable suggestions were made as to building the industry through proper publicity. Merrel E. Hixson, formerly advertising manager of the Bakersfield "Californian,"

and recently appointed advertising field representative of the campaign, was present at the meeting.

The question of a change in the name of the campaign organization was discussed, it being felt by some of the members that a designation was required to indicate the permanency of the cooperative council. A valuable report was rendered on the use of the bonus to employees as a builder of business. G. E. Arbogast told of the working up of plans for a "Model Electrical Home," being widely published in Los Angeles, several thousand copies having been issued for distribution.

Those present at the committee meeting were Lee H. Newbert, chairman; G. E. Arbogast, R. M. Alvord, A. W. Childs, M. A. De Lew, D. E. Harris, M. L. Scobey, K. E. Van Kuran, A. E. Wishon, Howard Angus, secretary; M. E. Hixson, advertising field representative. Guests present were T. E. Bibbins, president Pacific States Electric Company, and Aubrey Drury, associate editor of the Journal of Electricity.

Electrical Contractors and Dealers' Association of San Francisco

At the meeting of November 28th, Electrical Contractors and Dealers' Association of San Francisco, it was decided that any bids should be opened at the request of any interested bidder after the closing time of bids. D. E. Harris, representing the California Electrical Cooperative Campaign, addressed the meeting and urged that contractors advertise in a manner similar to the electrical dealers. A special committee was appointed to confer with the Cooperative Campaign on this matter. Clyde L. Chamblin presided.

Proposed changes in the by-laws of the association, drafted by Secretary Louis Ardouin, were given their first reading at the meeting of December 5th. Important subjects affecting the industry were discussed, including the proposed amendments to City Ordinance 2582, pertaining to electrical wiring regulations. The association unanimously endorsed the ordinance as revised. W. D. Kohlwey acted as chairman of the meeting.

Committee Activities

The Overhead Systems Committee of the National Electric Light Association is planning in its report to bring to the attention of the industry any new devices that, in the Committee's opinion, would be useful in line construction or line maintenance work. In order to make the report as useful as possible, the committee would be glad to get into touch with any manufacturers making such tools or devices for use in overhead line work.

It is not the committee's plan to include in its report anything whatever regarding the various lines of standard fixtures that are on the market, but to call attention to special articles that might prove of particular value to operating companies.

Any data regarding such items should be sent to the chairman of the Overhead Systems Committee, at the above address.

Otto A. Knopp, vice chairman of the N. E. L. A. meter committee and representing the Pacific Coast Section thereon, has completed a trip throughout California in order to confer with the other California members of this national committee. These include A. E. Coney, Great Western Power Company, San Francisco; W. R. Frampton, Southern California Edison Company, Los Angeles; C. F. Gilcrest, San Joaquin Light & Power Corporation, Fresno; John M. Morris, Westinghouse Electric & Manufacturing Company, Los Angeles, and W. H. Talbott, San Diego Consolidated Gas & Electric Company.

HAPPENINGS IN THE INDUSTRY

WESTERN POWER SITUATION RELIEVED BY RAINFALL

With heavy snow in the mountains and commensurate rainfall in the lower foothills, the companies that supply San Francisco and the Coast cities with electric light and power are now running their hydroelectric plants under more favorable circumstances than for several weeks.

The Pacific Gas & Electric Company reports forty-two inches of snow at its Spaulding power station, which is exceptionally heavy for this time of year, and promises well for the season.

There is now adequate water to feed most of the turbines to capacity, and as a result the company is in a position to reduce materially the demands upon its steam auxiliary plants that have recently been run to a load beyond their normal economic speed rate.

The Sierra & San Francisco Power Company reports a marked improvement of the situation as a result of the snowfall, but its principal plants at the higher altitudes have not yet profited thereby. The rainfall at lower altitudes has already given it about 25 per cent additional power, and the promise of a thaw higher up will probably put their supply at normal almost immediately.

Meanwhile the relief afforded by the rain has been such as to reduce the load on its local power plant to such an extent that it is no longer necessary to overwork the boilers so heavily.

This means better and more complete combustion of the oil fuel used and a consequent reduction of the smoke nuisance.

ELECTRICAL DEVELOPMENT IN THE ORIENT

A preliminary announcement has been made in Japan of a new hydroelectric project which proposes to develop the water power of the Hime River and neighboring streams in Echigo Province, to be capitalized at \$15,000,000.

The Inawashiro Hydroelectric Company, one of the largest water-power plants in Japan, held its stockholders' meeting on October 25 and among others the third extension of the system was presented for approval. The total cost of extension, which includes the construction of the third power-house and the erection of new transmission lines to Tokyo, will amount to about \$12,500,000. The total power obtainable from the extension is 26,000 kilowatts.

The auxiliary steam power plant of the Kinugawa Water-power Company, which has been under construction for some time, is near completion and by the end of September the firing of boilers is expected. The output of the plant is 8,000 kilowatts in total and will be used as auxiliary to the water-power plant. The company serves the city of Tokyo and much inconvenience has been felt by shortage of power from its water-power plant.

ELECTRIC POWER PRODUCTION

The following reports of electric power output for February, March, and April, compiled by the Division of Power Resources, U. S. Geological Survey, are based on returns received from about 3,100 electric power plants engaged in public service, including central stations, electric railways, and certain other plants, the output of which contributes to the public supply. Returns were received from plants whose aggregate capacity is about 90 per cent of the generating capacity of all public utility plants. Estimates of the output of plants which did not make returns were made from available information. The total "estimated" power is only about

7 per cent of each monthly total. The average daily output in kilowatt-hours for the different months is as follows: February, 106,540,000; March, 101,620,000; and April, 100,880,000. Amount produced by water power: February, 39 per cent; March, 42 per cent; and April, 43 per cent.

THOUSANDS OF KILOWATT-HOURS PRODUCED

State	By Water Power			By Fuels		
	February	March	April	February	March	April
Alabama	39,341	30,275	28,488	11,059	4,907	4,477
Arizona	3,967	6,689	7,577	17,448	21,807	16,488
Arkansas	79	72	69	6,252	6,625	6,030
California	187,486	215,914	228,776	38,268	33,939	33,645
Colorado	13,141	14,254	15,019	17,279	17,144	14,365
Connecticut ..	7,043	14,884	16,804	42,689	37,469	35,525
Delaware	—	—	—	5,551	4,784	4,655
District of Columbia ..	—	—	—	18,094	19,331	18,457
Florida	678	892	777	8,582	8,789	7,776
Georgia	35,909	37,264	31,404	6,054	5,082	6,200
Idaho	41,430	39,913	36,019	168	257	155
Illinois	15,611	16,282	16,134	198,899	207,673	194,109
Indiana	3,682	3,654	3,511	52,342	54,617	51,980
Iowa	44,182	48,696	48,737	23,993	24,964	23,646
Kansas	1,267	1,223	913	29,619	30,458	30,870
Kentucky	4	4	4	18,794	19,127	18,655
Louisiana	—	—	—	14,180	14,876	14,582
Maine	18,831	20,157	18,708	73	73	93
Maryland	284	371	358	18,435	13,898	11,442
Massachusetts ..	18,898	31,365	32,322	101,799	100,030	90,601
Michigan	52,236	59,649	65,211	97,285	96,126	88,363
Minnesota	18,303	32,740	43,204	26,826	15,220	7,261
Mississippi	—	—	—	5,116	6,393	4,927
Missouri	4,297	5,920	4,418	37,207	40,551	36,245
Montana	68,408	77,869	77,853	883	888	821
Nebraska	748	959	1,118	15,493	16,413	16,004
Nevada	3,198	2,812	2,470	137	121	727
New Hampshire ..	4,946	5,763	5,683	2,309	2,114	1,893
New Jersey	162	197	187	75,665	76,412	76,642
New Mexico	57	56	80	1,416	1,656	1,455
New York	195,219	223,078	220,677	288,271	288,537	270,644
No. Carolina	42,645	46,318	45,755	7,149	7,426	7,082
North Dakota ..	—	—	—	2,312	2,400	2,103
Ohio	3,053	3,932	3,565	189,041	194,937	183,702
Oklahoma	167	183	149	13,080	13,796	12,989
Oregon	27,876	29,113	27,248	4,754	3,759	3,539
Pennsylvania	55,098	62,509	58,466	238,970	245,920	233,597
Rhode Island ..	562	1,042	725	28,767	18,405	16,839
So. Carolina	43,599	43,394	43,287	3,876	4,010	3,676
So. Dakota	2,583	3,579	4,104	2,949	3,208	1,920
Tennessee	43,640	45,222	37,999	9,774	10,680	10,405
Texas	266	284	305	43,070	47,616	44,816
Utah	13,135	16,463	17,434	—	—	—
Vermont	13,428	18,574	19,482	173	179	187
Virginia	17,833	20,122	19,298	17,254	18,709	16,539
Washington	70,779	79,346	74,575	4,171	4,621	4,164
W. Virginia	1,378	1,593	1,642	62,620	58,108	59,396
Wisconsin	32,534	47,531	48,880	32,916	33,075	24,682
Wyoming	248	172	138	3,580	3,898	3,514
Totals	1,148,634	1,308,329	1,308,573	1,834,487	1,841,837	1,717,788
Totals, by water power and fuels	—	—	—	2,893,121	3,150,166	3,026,361

FIFTIETH ANNIVERSARY OF THE WESTERN ELECTRIC COMPANY

This year marks the completion of fifty years of existence of the Western Electric Company. The company had its beginning back in 1869 when the partnership of Gray and Barton was formed to manufacture telegraph apparatus, bells and buzzers. This was in the very infancy of the commercial application of electricity.

The firm of Gray and Barton was succeeded in 1872 by the Western Electric Manufacturing Company, which in turn was reorganized in 1881, when it became the Western Electric Company. The company is, therefore, the oldest manufacturer in the United States engaged continuously and exclusively in producing electrical apparatus.

The growth of the company from its earliest days is a reflection of the growth of the electrical industry. It may be interesting to note that the total business of the company for 1885 was \$1,312,000, which in 1919 will be just about tripled in one week.

The Western Electric Company maintains about twenty houses in the United States and has established manufacturing and distributing centers in all the important cities of the

globe. The manufacturing plant at Hawthorne, Chicago, covers 210 acres of land, sixty acres of forest space, and employs nearly twenty thousand men and women.

Fifty years may not be such an extraordinarily long span in the life of other businesses, but in the electrical business it represents almost the total life of electricity as a commercial asset. To fittingly celebrate this anniversary, the employes of the San Francisco house plan to hold an entertainment and informal dance on the night of December 19, 1919.

DIESEL ENGINES FOR WOODEN VESSELS

Contracts are to be closed by Alexander Winton, head of the Winton Engine Works of Cleveland, with a number of San Francisco shipping concerns for the installation of Diesel electric drive in wooden hulls constructed as steamers by the U. S. Shipping Board but never completed.

The installation of the Diesel engines and electric drive promises completely to revolutionize the construction and operation of ocean freighters and probably passenger craft.

There are more than a score of Ferris type hulls completed and waiting for the installation of the machinery. These are distributed at various Pacific Coast ports.

The Westinghouse Electric Company and the Winton Company will supply the motors and electrical equipment. According to comparative figures as prepared by the engineers, the new type of ship power has a vast advantage over the steam boiler and triple expansion plant.

The figures follow:

Diesel Elec. Drive.	Triple Exp. Plant.	
Indicated horsepower	1400	1400
Weight of plant installed.....	220 tons	300 tons
Fuel used per hour per horsepower.....	45 pounds	1.25 pounds
Fuel used per hour.....	1.9 barrels	5.4 barrels
Fuel used per day in barrels at sea.....	47.2 barrels	129.6 barrels
Fuel used per day in port.....	8 barrels	26 barrels
Cost of fuel oil per barrel.....	\$1.85	\$1.60
Cost of fuel per day at sea.....	\$87.32	\$207.36
Cost of fuel per day in port.....	\$14.50	\$41.60
Days at Sea.....	270	270
Days at sea.....	95	95
Water used per day for power plant.....		3.75 tons
Fuel used per day.....	6.74 tons	18.64 tons
Weight of fuel carried.....	220 tons	650 tons
Weight of water carried.....	50 tons	170 tons
Cost of water per ton.....	\$1	\$1
Cargo carried in dead-weight tons.....	3400 tons	3000 tons
Earning power of ship D. W. T., one yr.....	\$50	\$50
Fuel used in year.....	13,504 barrels	37,462 barrels
Water used in year for power plant.....		1,125 tons
Total cost of fuel and water for one yr.....	\$24,983	\$61,065
Profits of ship in one year.....	\$170,000	\$150,000
Total net profits per year.....	\$145,017	\$88,935

A unique feature of the new system is that the engines will be placed on the deck, aft, under the poop. Being placed directly over the twin motors which are geared to the propeller shaft, there will be only a short run of the insulated conduits, and the grave problem of adequate insulation has been easily solved.

Each of the engines will have eight cylinders, and having a high speed like that of an automobile, the twenty-four cylinders will cause but slight vibration. An extra athwartship bulkhead is to be placed under the engines as added support.

POWER AND IRRIGATION PLAN

An application to the State Water Commission to appropriate 2,000 second feet of the storm and surplus waters of the Kern River stream system for the purpose of developing the hydro power and for use in irrigation, was filed recently with the commission by the Kern Delta Irrigation District.

The proposed power dam is to cost \$15,000,000 and will be built at the junction of the Kern river and its south fork, at Isabella, sixty miles northeast of Bakersfield. The dam will impound 1,500,000 acre feet of water and will generate 150,000 theoretical horsepower, according to the applicants for the water diversion permit.

EMPLOYES' CO-OPERATIVE STORE

The employes of the Westinghouse Electric & Manufacturing Company have opened a co-operative store where employes can buy provisions at cost.

The large storeroom or distribution depot has been secured at 709 Braddock Avenue, East Pittsburgh, Pa., just opposite the general offices of the East Pittsburgh works. At this distribution depot employes can purchase standard commodities such as flour, ham, bacon, coffee and canned goods. Other standard commodities will be added from time to time as the demand becomes evident.

This co-operative buying scheme is managed entirely by a committee of employes. The movement is endorsed by the management of the company, which has placed with the committee its facilities for placing orders with a standing credit where provisions can be purchased at the lowest cost. The co-operative buying will be done on the cash and carry basis, each person paying cash and carrying his purchase home.

While this plan has just been announced by the committee, it is meeting with general approval and will probably result in quite a saving to the employes taking advantage of it.

POWER PLAN IN NORTHWEST

The construction of two power plants along the Tumalo River at a cost of approximately \$229,000, for the development of 4,225 horsepower, is contemplated by the Bend Water, Light & Power Company, which filed application with the State Engineer's office recently for permission to appropriate 50 second feet of water from Tumalo Creek.

According to plans submitted with the application, the company proposes to appropriate the water in two falls. One of the plants would be operated with water taken from the canal of the Tumalo irrigation district and the other from a canal to be constructed lower down the stream.

Inasmuch as the plan involves the appropriation of water already appropriated for irrigation purposes, the company proposes the construction of another irrigation canal, lower down the river, from which to supply land that would be deprived of water by reason of the connection of the power plant with the Tumalo irrigation canal. A contract embodying the phase of the project was presented to the State Land Board by the company some time ago and is still pending. Action by the State Engineer's office upon the power application depends upon the approval of the contract by the State Land Board.

LIGHTING SYSTEM DIFFICULTIES IN SAN FRANCISCO

The famous Market-street lighting system, known as the "Path of Gold," is in danger of being lost to San Francisco.

The Down Town Association in 1916 entered into an agreement with the Board of Supervisors and the gas company to install this wonderful system of street lighting, which has been one of the wonders of the West to travelers who have visited San Francisco. The system was installed and the Down Town Association undertook to collect subscriptions from the property owners and tenants on Market street for a period of three years to pay the cost, which amounted to approximately \$24,000 a year, the United Railroads assuming a small portion of the expense of lighting of one of the lamps and the city the top light.

The contracts of the merchants and property owners on Market street having expired, an attempt was made to renew the contracts for another three-year period, as the investment of the Pacific Gas and Electric Company, which put up the molded standards, could not be repeated unless the lights were operated for at least ten years continuously.

The franchise of the city calls for one single light to be maintained by the street-car companies on Market street,

and it is practically certain that under the franchise with the two outer brackets closed the railroad companies would not feel obliged to assume the burden of keeping this high-powered light lit on the street; hence the gas company will be compelled to desert the entire "Path of Gold" system.

The association holds the funds merely as a trust, without profit, and, in fact, at a great expense to the association proper; and the lack of cooperation on the part of the property owners and tenants and the inability to make up the deficit in the rapidly dwindling amount of the finances of the lighting funds have forced the issue until it has appeared that there is no alternative but to turn out the lights and substitute the old-style system of lighting.

A canvass of every property owner, leaseholder and tenant of Market street is to be made by circular and solicitor, in an endeavor to secure a sufficient number of renewals of contracts to keep the lights burning.

IN HONOR OF MARCONI

A special fund for immediate work in relieving the distress of Italian war orphans, maimed soldiers and other war victims has been started under the auspices of the Italian War Relief Fund of America, to be known as the Marconi Fund for Italy, and a special committee has been appointed to represent the electrical interests of America. The committee consists of Elihu Thomson, John W. Lieb, and T. Comerford Martin.

It is hoped that \$50,000 will be raised, and the fund is being confined primarily to those engaged in the electrical industries in America. Contributions should be sent to Mr. T. C. Martin, 29 West 39th St., chairman of the special fund.

REGISTRATION OF ENGINEERS

A committee of fifteen representative engineers from all parts of the United States formed under the Engineering Council has been giving careful study for many months to the matter of licensing or registering of engineers. A preliminary draft of a model law was circulated in manuscript for criticism. Up to this stage the committee's work was necessarily done by correspondence. October 13 to 17 the committee met in Chicago, and devoted five days and evenings to a thorough discussion of the information and comments collected, and the drafting of a revised form of the proposed model law. This revised draft has been submitted to the members of the committee for final consideration and editing. It is expected that the results of the committee's work will be presented to the Engineering Council at its December meeting, and that subsequently the model law can be made known to engineers throughout the country, through the publications of the societies and the technical journals. That well considered and uniform legislation is advisable, is shown by that fact that there is a steadily increasing demand in a number of States for the passage of some law to regulate the practice of engineering, and that eleven States have already enacted such laws, differing materially in their provisions. Seventeen States likewise have upon their statute books laws regulating the practice of architecture as a profession. Such legislation recently went into effect in Oregon. It was considered as a possibility at the last session of the California legislature, but was postponed until more unified support among the engineers would be assured.

TRADE NOTES

Western Representation —

R. C. W. Libbey, Western representative covering territory west of Denver for the Simplex Electric Manufacturing Company, is making an extended trip through the Northwest. He will in the future make his headquarters in San Francisco. Holbrook, Merrill & Stetson are so well pleased with results obtained in handling Simplex electric ranges and heaters that they have now arranged to act as distribu-

tors for the complete line of the Simplex Electric Manufacturing Company in California, Nevada and Arizona.

Export Shipment of Electric Furnace Equipments —

Electrical equipment for twenty electric furnaces, made by the Westinghouse Electric & Manufacturing Company, which, when placed in operation, will comprise the largest electric furnace installation ever made, is now being shipped from the United States to the Glomfjord Smeltverk Company, of Glomfjord, Norway.

District Offices Opened —

The recently incorporated Booth Electric Furnace Company has opened up the following district offices in connection with the sale of electric furnaces for melting steel, iron, and non-ferrous metals:

For New York and New England, Edward B. Stott & Co., Flatiron Building, New York City, with E. F. Tweedy, secretary of the company, directly in charge; for Eastern Pennsylvania, New Jersey, Maryland, Delaware, and Southern Atlantic Coast States, Northern Engineering Company, 308 Chestnut St., Philadelphia, with F. W. Doran in charge; for Northeastern Ohio, Western Pennsylvania, and Western New York State, Chas. L. Foster, formerly sales manager of the Electric Furnace Company, of Alliance, Ohio, with offices at 879 The Arcade, Cleveland, Ohio.

In connection with these district offices a complete staff of engineers and metallurgists will be maintained so that the needs of customers can be promptly met and adequately taken care of.

Western Branch Office —

L. A. Somers, for 21 years connected with the electrical industry in Canada and the United States, recently severed

his connections with the Westinghouse Electric and Manufacturing Company and accepted a proposition to open an office in San Francisco for The McMyler-Interstate Company of Cleveland, Ohio.

The McMyler-Interstate Company is a merger of the McMyler Manufacturing Company and the Interstate Engineering Company. These two companies have an uninterrupted combined history

of about 35 years in the manufacture of coal and ore handling machinery, locomotive cranes, ship building cranes, car dumpers, pile drivers, railroad equipment, clam shell, scraper and orange peel buckets.

Mr. Somers has specialized on the application of electric apparatus and steam turbines to shipyard practice.

The building of the famous electrically operated battleship "California," which was recently launched at the Mare Island Navy Yard, was facilitated by the use of two shipbuilding cranes of the Hammerhead type, built by The McMyler-Interstate Company.

Bulletins describing these cranes and other types of cranes this company manufactures will gladly be furnished on written request, addressed to the company's offices, 407-409 Merchants Exchange Building, San Francisco, California.

The McMyler-Interstate Company has contributed some noticeable examples to the art of the mechanical engineer, chief of which, perhaps, may be mentioned a 350 gross ton capacity fitting-out crane. This crane, which has a capacity of 392 net tons, is probably the largest capacity crane, of any description, which has ever been built. It is electrically operated and therefore possesses great interest for electrical as well as mechanical engineers. It is now being erected in the Philadelphia Navy Yard, at Philadelphia, Pa.



LATEST IN EVERYTHING ELECTRICAL

(An automatic electric range with a number of special features is one of the new items on the market to meet the steadily growing demand for electrical household equipment. A new reflector, a convenient attachment plug, and a warning light for a switch box are among other new industrial devices reviewed here.—The Editor.)

AN ELECTRIC RANGE

The automatic time control is one of the features of the new Hughes automatic electric range recently put on the market by the Edison Electric Appliance Company. The automatic time control is an electrically operated timing



This range is furnished with automatic time-control and temperature regulator which simplify cooking to a remarkable degree by practically eliminating supervision.

device that automatically turns current on and off at any hour desired. It is simple to use, requires no winding, as does a clock and is always ready for immediate use.

Another item of interest is the automatic temperature regulator—a thermostat that automatically maintains the heat of the oven at any desired cooking temperature indefinitely. The proper oven temperature at which to cook the food is determined first; then the regulator is set by means of a lever as shown on the instruction card which is permanently secured to the side splash.

This regulator is one of the distinctive features of the new range and is in addition to the automatic feature which turns the current on and off.

The automatic temperature regulator prevents extravagance in current by supplying just enough heat to keep the oven at any desired temperature—it saves food because it prevents easy scorching or burning, and at the same time provides the particular temperature which is most suitable.

As the oven heats, the indicating pointer on an oven thermometer moves up the thermometer scale until it is opposite the adjustable pointer which designates the temperature to which the oven is to be heated. It then cuts the current off by means of the thermostat and just as soon as the indicating pointer drops below the adjustable pointer, the current is again automatically turned on. This continues until the time the current is set to turn off, so that an even temperature is maintained during the entire cooking operation. It keeps you informed as to how hot the oven is at any time. The thermometer responds quickly to fluctu-

ations in oven temperature and shows actual temperature whether the oven is being heated or cooled. It is strictly a thermometer and accurately indicates temperature in degrees.

The automatic range can be used three different ways:

1. The automatic time control and temperature regulator are both set, giving full automatic control.

2. The temperature regulator only is used, the current being turned on and off by hand at the oven switches. In other words, the temperature regulator is set, the switches turned on by hand, and the indicating pointer moves up the scale and operates in the same manner as described above. This continues until the operator turns the current off by hand, at the switches.

3. The temperature regulator is used as a safety device only, both the current and temperature being controlled by hand. That is, the temperature regulator is set at the top of the scale, so that there is no possibility of overheating the oven. Should the operator forget to turn the current off, the thermostat would perform this function just as soon as the indicating pointer reached a position parallel to the temperature regulator.

NEW REFLECTOR

The National X-Ray Reflector Company of Chicago announce the production of a new X-Ray, silver-mirrored reflector—the X-Ray Tru Da reflector. These reflectors are blown of blue crystal glass, and give, for all practical purposes, a color-matching light wherever daylight is needed.

This reflector is placed on the market only after very extensive tests and experiments by the engineering department of the manufacturer.

The blue crystal reflector being the sole element in securing the white quality of the light, it became necessary



This portable light equipped with a special reflector is especially designed for stores to provide a color-matching light when daylight is not available.

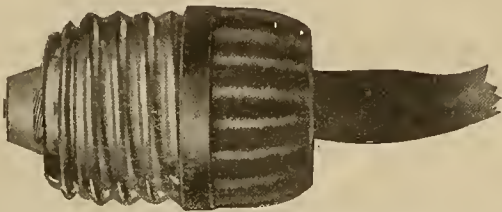
to use the greatest care in selecting and introducing the correct color pigment into the manufacture of the reflector.

The first of the X-Ray products to use the blue crystal reflector is the Curtis X-Ray True Da light, designed especially for use in stores. This is a portable light, which stands 16¾ inches high, is finished in dull black only, and is designed for placing on show cases and tables.

True Da lights require no colored lamps or diffusing plates; the clear white light is secured through the use of the X-Ray True Da reflector. They are economical in current, requiring only a 25-watt, round bulb, frosted Mazda lamp, and are supplied complete with lamp, 8 feet of cord, plug and switch ready to use.

NEW SWIVEL PLUG

A new swivel attachment plug has been developed in the Specialty Department of the Cutler-Hammer Manufacturing Company, Milwaukee, Wis. The design of this new plug is



A plug which is so constructed that it can be very simply wired, and will not come apart when unscrewed from the socket.

such that several distinct advantages are provided. It is shipped complete assembled and need not be taken apart in order to wire. The work of attaching these plugs is further reduced because there are no binding screws to loosen and untighten. In fact, no screws are used in the construction.

It consists of an inner and outer member which revolve on each other. The wires are connected to the inner member, while the outer member comprises the ordinary screw shell and a knurled head made of heat-proof molded insulation. In wiring two wires are stripped an equal length, about three-eighths of an inch; one is pushed into a center opening of the inner member and the other through any one of four concentric openings of the same number. By means of a stationary soldering iron, one wire is sweated in the center opening, while the other, after being turned over into a groove on the inner member, is soldered to it.

After being attached to a cord there is no possibility of the parts becoming separated when being unscrewed from a socket. This is a very desirable feature when the plug is used under a small shade or where a good grip on the plug cannot be secured. This new plug when shipped to the electric appliance manufacturer, reaches him in one complete piece. It cannot become dissembled nor a portion lost in shipment or in distribution. Trouble and losses due to difference in the number of the component parts on hand are thus avoided.

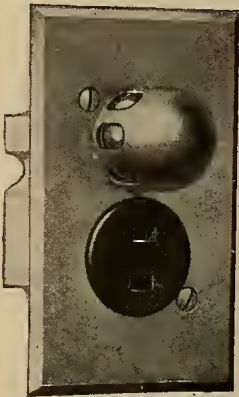
WARNING LIGHT FOR SINGLE SWITCH BOX

It is a recommendation of the National Electrical Code that in connection with smoothing irons, sad irons and other heating devices that are intended to be applied to combustible articles, there should be a warning signal to indicate that the current is flowing. Compliance with this recommendation has been rather slow because of the nature of the fittings that were available for the purpose. These were expensive in first cost and were also expensive to install, because of their size; some of them requiring a two-bang box, but most of them a three-gang box.

The Bryant Electric Company of Bridgeport, Conn., have just placed on the market a device which is a combination of their standard Spartan flush receptacle and warning light. The two are combined in a single porcelain which can be installed in a single switch box. The Spartan receptacle will receive any of the numerous Spartan and other standard parallel bladed caps. The 2-candle power, 125-volt, candelabra base warning lamp, which is connected in parallel with the receptacle, is protected from mechanical injury by a perforated brass cage. When occasion requires the lamp

can be renewed by simply removing the face plate of the device. The connection in the receptacle are such that the lamp automatically lights up when the attachment plug cap is inserted, thus doing away with the necessity of a snap switch which is frequently a component part of devices designed for the purpose.

The use of a device of this kind is not only advisable from the fire prevention standpoint but also from the stand-



A flush receptacle and warning light combined for a single switch box, the bulb lighting up when the attachment plug cap is inserted.

point of economy in connection with the less hazardous but widely used domestic appliances such as percolators, toasters, chafing dishes, curling irons, etc., since it tends to diminish the unintentional and undiscovered consumption of current. All internal connections are made complete at the factory so that the device can be substituted for any receptacle at present installed, by simply attaching the line wires to the two terminals that are provided. This device, designated by catalog number 121, is equally advantageous in new installations in place of the ordinary type of receptacle.

NEW METHOD OF PACKING MAZDA LAMPS

After considerable experimentation and testing, the Westinghouse Lamp Company has determined upon a new packing method for its incandescent lamps. This new packing is now being used for a large proportion of the shipments made from its factories.

In the past the regular Mazda lamps have been simply inserted in a corrugated paper sleeve, and then placed in five-lamp cartons. Hereafter the use of the five-lamp carton will be discontinued. The lamps will be individually wrapped in attractive wrappers, the ends of which are tucked in so as to completely protect the tip of the lamp and at the same time serve as a cushion for the lamp itself. The individually wrapped lamps are then packed in a heavy cardboard tray.

As the well-known orange-and-black design of the Westinghouse Mazda Lamp carton will be used on the new wrapper as well as the trays, the new packing will look just as familiar to customers as the old carton design, which has been so extensively advertised.

In addition to the better protection of lamps afforded by the new packing, it also makes easier the handling, packing and reshipping of lamps by distributors and agents. No excelsior is needed in the new packing. Comparative shipping tests show that it is far superior to the old style packing in every respect.

The index for volume 43 of the Journal of Electricity, covering issues from July 1st to Dec. 15, 1919, is now ready, and will be forwarded to any subscriber on request.

NEW ELECTRICAL DEVELOPMENT

(Electrification of mines and large industrial plants is a feature of the news from the Pacific Northwest. Progress on various important power and irrigation projects is reported in the Pacific Central district, while in both the Pacific Southwest and the Intermountain district bids are being received in connection with extensive plans for agricultural, industrial and municipal development.—The Editor.)

THE PACIFIC NORTHWEST

HOQUIAM, WASH.—Sufficient signatures for petitions for curb lights on city streets have been obtained to guarantee installation.

TACOMA, WASH.—Commissioner Ira S. Davisson of the Light and Water Department, Tacoma, received bids on December 10 for \$20,000 worth of electric ranges.

SEATTLE, WASH.—Recommendation that a permit be issued to the city to develop the water power resources of the Skagit River will be made to the Secretary of Agriculture by George H. Cecil, District Forester, Portland.

PORTLAND, ORE.—The North Portland Box Company's plant, destroyed in a recent fire with a loss of \$25,000, will rebuild at once. Machinery will be electrically operated. Coast Steel & Machinery Company of Portland has contract for a considerable portion of the machinery.

DALLAS, ORE.—Dallas Machine & Locomotive Works have been organized by Carl F. Gerlinger, R. L. Chapman and W. G. Vassail, with capital stock of \$35,000 and will engage in construction, erection and repair of machinery, engines, motors, locomotives and foundry products.

BAKER, ORE.—J. K. Romig and J. R. Romig, Jr. have filed an application with the State Engineer for appropriation of 25 second feet of water from Eagle Creek. A 2½ mile pipe line is contemplated with other improvements to cost about \$300,000. The intention is to develop 700 horsepower for mining purposes.

SEATTLE, WASH.—The Grays Harbor Commercial Company, Cosmopolis, Washington, which now operates one 750 kilowatt generator unit, is installing another unit of the same capacity for meeting additional power requirements for the next year. The company manufactures staves for wood pipe, tanks, silos and boxes.

SEATTLE, WASH.—The North Bend Lumber Company has brought suit against the city of Seattle in the sum of \$401,629.02 as compensation for destruction on December 23, 1918, of lumber mills, machinery and dwelling houses, alleged to have been flooded and swept away by reason of seepage through the north bank of the reservoir behind the city's Cedar River dam.

SEATTLE, WASH.—Superintendent of Utilities Thomas F. Murphine of Seattle states that if the unusual congestion on the downtown streets of the city is to be avoided, the street car terminal must be located at the north end of the business district. He states that over \$1,000 a day is being lost by running all cars down First, Second and Third avenues to Jackson Street.

SEATTLE, WASH.—State Supreme Court has rendered a decision permitting city to sell below par \$790,000 5 per cent street railway bonds and \$1,250,000 lighting department bonds. It is possible at expiration of thirty days to dispose of the bonds and begin erection of an addition to the Lake Union auxiliary light plant. Contemplated extensions to municipal car lines are also made possible.

MORRISTOWN, WASH.—According to B. W. Lyon, representative of the Peabody Coal Company, of Illinois, recently arriving in Seattle to become manager of the Jafet-Lindeberg mines in this place, says the property is to be developed into a large producer. These mines now produce 250 tons a day and this is to be in-

creased to 1,500 tons. Electrification is to be started at once and new washing and cleaning machinery will be installed at a cost of about \$15,000.

SEATTLE, WASH.—The City Council failed to pass over the veto of the Mayor, a bill appropriating \$14,000 for repaving East Union Street from Twenty-ninth to Thirty-fourth Streets, the amount to be taken from the city railway fund. The matter involves the possibility of a raise in street car fare by the city lines. It is claimed that to do all the paving that would fall to the municipal lines would cost \$500,000 and that the city system could not pay this without a raise in the fares to six cents.

SPOKANE, WASH.—Two hundred men, employed in the light and power plants of the Washington Water Power Company, have been granted wage increases averaging 13 per cent and totaling approximately \$40,000 a year, according to W. E. Coman, general manager. "This increase is made on account of the abnormal cost of living," said Mr. Coman. "Some of our lower-paid employees were given a slightly larger proportionate increase than the higher-paid men, with the view of giving all a good living wage."

CHEHALIS, WASH.—The North Coast Power Company has filed with the Public Service Commission of Washington tariffs covering power and residential lighting current, showing increase of rates amounting in some instances to 100 per cent. The company furnishes electric service to Centralia, Chehalis, Tenino, Bucoda, Kelso and Kalama. For supplying current to municipal distributing plants, the company establishes a minimum ready-to-serve charge of \$600 a month for Chehalis, and \$1,000 a month for Centralia.

SALEM, ORE.—The Bend Water, Light & Power Company contemplates construction of two power plants, one on the Tumalo River at a cost of approximately \$230,000, to develop 5,225 theoretical horsepower. The conveyance of water through the Tumalo Irrigation Canal and the development of power by means of two plants on Tumalo Creek under a total head of 745 feet are contemplated. The construction of two pipe lines about three miles long will be necessary, also the construction of power houses and other buildings.

SEATTLE, WASH.—Sealed proposals will be received by the Board of Public Works up to 10 a.m. December 26, County-City Building, for furnishing the city lighting department with all the steel completely fabricated for a pipe line 78 inches (inside diameter), delivery to f.o.b. Cedar Falls. Amount of surety bond that successful bidder will be required to file with the City Comptroller will be 50 per cent of the contract price. Sealed proposals will also be received by the Board of Public Works up to December 19 for furnishing the city lighting department with four 5,667 kva. oil, insulated, water cooled transformers complete with accessories and oil, f.o.b. cars at Seattle.

PORTLAND, ORE.—Sealed bids for the erection of two double-leaf trunnion bascule bridges with their approaches and appurtenant works on Columbia River highway across Young's Bay near Astoria, Oregon, will be received by State Highway Commission of Oregon, Room 520 Multnomah County Court House, Portland, up to December 20, 1919, at 10 a. m. Included

in the equipment will be large quantities of structural and reinforcing steel, machinery, necessary accessories (pumps, motors, signal lights, etc.), electrical equipment. Plans may be obtained at the office of the State Highway Commission and State Highway Engineer, State House, Salem, Oregon. Certified check or cash bidder's bond for an amount equal to at least 5 per cent of the total amount of bid for constructing bridge required.

THE PACIFIC CENTRAL DISTRICT

MERCEDES, CAL.—The Merced Irrigation District, to cost \$5,000,000, is to be formed. The district comprises 173,000 acres.

SUSANVILLE, CAL.—Judge Moncur has adjudged the Baxter Creek Irrigation District bonds as invalid. C. S. Bond filed suit against the district.

MADERA, CAL.—Petition to establish the Madera Irrigation District, to comprise more than 300,000 acres, was passed by the Board of Supervisors, with no dissenting votes. The petition was referred to the State Engineer as required by law.

HONCUT, CAL.—The directors of the Honcut-Yuba Irrigation District have organized by electing H. S. Munson, chairman, and C. N. Hill, secretary. V. P. McCray and Frank S. McCray were appointed engineers. Surveying for the preparation of plans and specifications for the irrigation district will commence without delay.

FRESNO, CAL.—The San Joaquin Light & Power Corporation, operating in Central California counties, made application to the State Railroad Commission for authority to continue in effect the Commission's order made last January granting a 5 per cent surcharge of its rates. The date set for the expiration of the order is January 15, 1920. The company said in its application that the surcharge had failed to produce the estimated increase in revenue and asked the Commission to make such changes in the company's base rate as will provide relief.

RICHMOND, CAL.—The Pacific Insulating & Refrigerating Company, which has already purchased a site and one large building, will begin operations after the first of the year, adding to this city a place that will rank among the larger ones here. The manufacturing corporation paid \$75,000 for the property and has arranged to acquire some more land adjoining the site. It will erect another building the size of the one purchased. It is probable that one large item for the new plant will be the supplying of insulated pipe and refrigeration for ships being constructed.

REDDING, CAL.—According to the plans and specifications as being drawn by the Pacific Gas & Electric Company engineers, the first unit of their contemplated hydroelectric power development at Big Bend will call for an expenditure of \$10,000,000 in two and a half years. The company has at present twenty-five men building outhouses and running preliminary surveys. Engineer Downing says there is no doubt but what Pit River is the largest hydroelectric power stream undeveloped in the State of California. He says his company is planning for future development of many power sites on Pit River.

SANGER, CAL.—At the regular meeting of the City Trustees the ordinance providing for the installation of an electrolyser system in the

business section of Sanger was given its final reading and was passed.

CHICO, CAL.—Extension of the Sutter-Butte Canal Company's lines south from Live Oak to a district east of District 1,500, Sutter County, is now under way. The improvements are in charge of J. L. Tullock, of Gridley, manager of the concern, and will cost \$15,000.

MARTINEZ, CAL.—An election will be held in Ridge Land Irrigation District No. 2,036 on December 16, at which there will be submitted to owners of land in the district the question of whether or not the bonds of the district shall be issued in the amount of \$256,940.

CHICO, CAL.—Plans for the installation of an improved lighting system in the annexed section of Chico have been prepared by the Pacific Gas & Electric Company and will be presented for approval by the Trustees at their next meeting.

SACRAMENTO, CAL.—State Engineer W. F. McClure announced that he has investigated and will report favorably on the irrigation project of the Fall River Valley District in Shasta County, where it is proposed to water 16,000 acres. The water supply from Fall River is ample, McClure said.

FRESNO, CAL.—By a resolution adopted, the Board of Supervisors approved the sufficiency of the petition for the formation of the Riverdale Irrigation District. The matter now goes to the County Engineer's office for the engineering details, after which another hearing will be held on March 1 to establish the boundaries of the proposed district.

TURLOCK, CAL.—The total amount of the bond issue to be asked for by Turlock Irrigation District in connection with the Don Pedro project is \$4,108,000, divided as follows: Dam construction, \$2,570,000; power plant, \$420,000; transmission substations and distributing lines, \$608,000, with an additional \$510,000 for the improvement of canals and construction of additional drainage ditches.

WOODLAND, CAL.—George F. Cokeley, of Woodland, has applied to the Railroad Commission for authority to enter the public utility field as a distributor of water for irrigation purposes. He plans the construction of a dam to cost \$110,000 to impound the waters of Panoche and Silver creeks, Fresno County. Cokeley is the owner of the Belmore or Chaney ranch of 6,720 acres in Fresno County.

TAYLORSVILLE, CAL.—The Feather River Company has ordered electrical equipment, a large compressor and other machinery for its Snowstorm group, adjoining the properties of the Engels Copper Company. The main working tunnel is in 250 feet and arrangements have been made for delivery of electric power to the property. The company is composed of Arizona copper men, headed by George W. Long, of Phoenix.

RICHMOND, CAL.—The Pacific Sanitary Manufacturing Company will shortly install an additional 50 horsepower in motors and the Metals Atomizing Company (a new concern) will start operations with one 100 hp. unit. Both will be served by the Richmond division of the Western States Gas & Electric Company. The second named company will add other units later. A new oil tank company building at Point Orient will require 25 horsepower in motors.

BAKERSFIELD, CAL.—An application to the State Water Commission to appropriate 2,000 second feet of the storm and surplus waters of the Kern River stream system for the purpose of developing the hydro power and for use in irrigation was filed with the Commission by Kern Delta Irrigation District, according to advices reaching Bakersfield. The proposed power dam is to cost \$15,000,000 and will be built at the junction of the Kern River and its south fork, at Isabella, sixty miles northeast of Bakersfield.

SAN FRANCISCO, CAL.—For the completion of irrigation and reclamation projects in the West an appropriation of \$50,000,000 is being sought by the recently organized Western States Reclamation Association, according to an announcement made by Charles H. Lee, of the State Water Commission. Superior California waterways come in for liberal appropriations for the next fiscal year. This is according to the estimates submitted to Congress by the Secretary of the Treasury. Among them are: Richmond Harbor, \$200,000; San Pablo Bay, \$103,400; Petaluma Creek, \$14,500; Humboldt Harbor and Bay, \$706,000; Mokelumne River, \$1,500; Sacramento River, \$75,000. Appropriations for buoys and lights and daymarks are asked as follows: Point Buchon and Fort Rose, \$10,000; Crescent City, \$4,500; Suisun Bay, \$2,500; Lake Tahoe, \$10,250. For the maintenance of dikes and dredging, underground electrical wiring system and paving at Mare Island Navy Yard, \$175,000. The recommendation for the Orland Irrigation project calls for \$120,000, and the Klamath project in California and Oregon for \$289,000. Indian appropriations asked for Superior California are: Fort Bidwell Indian School, \$29,000; road from Hoopa to Weitchpec, \$10,500; and for the irrigation of the Hoopa Valley Reservation, \$35,000.

THE PACIFIC SOUTHWEST

PHOENIX, ARIZ.—Bids for the completion of work on the Lyman dam, near St. Johns on the Little Colorado River in Apache County, will be called for shortly.

VENTURA, CAL.—Sealed bids were received by the City Clerk up to December 8, 1919, for construction and installation of twenty-two ornamental concrete street lights.

PASADENA, CAL.—A bond issue of between \$4,500,000 and \$5,000,000 will be asked for the struction of the Municipal Railway, according to a statement made by Commissioner John J. Hamilton.

SAN JACINTO, CAL.—The Coachella Valley Storm Water Board let the contract for erecting a spreading dam in Whitewater River wash near Palm Springs Station to Louis Ferrill, of Pomona. Contract price, \$15,865.

REDLANDS, CAL.—The Chamber of Commerce has approved a plan for organization under the new State law of a water conservation district composed of Orange, Riverside and San Bernardino counties, and steps will be taken soon to complete the organization of the district, which will seek development of additional water conservation of supply and flood water protection in the Santa Ana River basin.

FILLMORE, CAL.—The Sespe Light & Power engineers are here engaged in locating sites for dams and a big power plant. Frank Lock is the local engineer of the company. Big Sespe Oil Company's field will also be located.

CASA GRANDE, ARIZ.—W. H. Reed, Chief Engineer, United States Indian Reclamation Service, recommended that \$150,000 more be appropriated to aid the construction of the dam, with bridge superstructure near Sacaton, and \$75,000 be granted to apply towards aiding construction of the diversion dam above Florence.

THE INTER-MOUNTAIN DISTRICT

PUEBLO, COLO.—A new tract of one thousand acres of land north of Fowler, Colorado, will be irrigated by electric power next year, if plans under way mature. This will give the Arkansas Valley Railway, Light & Power Company an additional 150 horsepower of irrigation business. The company's output is running 15 per cent ahead of last year. Striking steel employees are anxious to return to work and the coal strike situation is gradually clearing. Neither of the strikes have affected the company materially and conditions in general are reported good. Eight electric household appliances were sold by the company during the week ended November 7. A new station will be

constructed at Pueblo, Colorado, on the present power house site of the Arkansas Valley Railway, Light & Power Company. The present power station, with a capacity of 7,500 horsepower, will be maintained and the new station with a present capacity of 10,000 horsepower will be constructed adjacent to it. This improvement, like the others, is necessary because of increasing business in present territory and not because of expansion of territory.

PLUMMER, IDA.—The village of Plummer, Idaho, will receive sealed bids for the construction of an electric line, and furnishing all material for the construction of such line, in the townsite of Plummer, Idaho.

BOISE, IDA.—Challis is assured a hydroelectric power plant, the State Public Utilities Commission having granted to W. W. Adamson proper authority to begin work and ordered him to begin construction of his plant and system within sixty days, and to keep a full, accurate and detailed account of all costs and expenditures in connection with the construction of the plant and system, filing the same with the Commission within thirty days after service is begun.

BUHL, IDA.—James J. Chambers, of Denver, Colorado, who owns power rights in Sand Springs north of Riverside Ferry, and H. E. Lindon, engineer of the firm of Beckman & Linden, San Francisco, met with the citizens of this place recently to discuss the proposition of furnishing water to this city from Sand Springs. Chambers stated that if the city would vote bonds for a water system and a municipal lighting and heating system, his company will supply water and current and take compensation in municipal bonds.

ST. ANTHONY, IDA.—Contracts for wiring two buildings at the State Industrial School, this place, was awarded to Pope Electric Company, Boise, at \$1,400.

SALT LAKE CITY, UTAH.—Business men of Sugar House, a suburban business district of this city, have petitioned the City Commission for permission to erect at the principal intersection of their business district a large electric sign in the form of a star with a suitable slogan directing attention to their locality as a shopping center. The sign will be 14 feet in diameter and suspended over the street intersection and is evidence of the value of this type of advertising in promoting a live "community spirit."

SALT LAKE CITY, UTAH.—The Public Utilities Commission of this State is now considering the application of the Utah Gas & Coke Company for an increase in rates. The valuation of the property is set at \$3,250,777, on which the company asks for 8 per cent return. The increase, if granted, amounts to approximately 44 per cent over present rates.

TREMONTON, UTAH.—The new street lighting system in the residence district of this city was put in operation for the first time on November 28. The "White Way" lighting for Main Street will be ready within a short time.

DELTA, UTAH.—In answer to a recent complaint filed with the Public Utilities Commission as to poor service rendered by the People's Telephone Company, that company has made formal application to the Commission for an increase in rates, stating that it is impossible to furnish adequate service under present rates. Hearing has been set for December 17.

BRIGHAM CITY, UTAH.—Mayor J. W. Peters officially closed the switch at 6 o'clock on the evening of December 1, which threw into operation the city's new electric lighting system and the "Great White Way" became a reality. There are forty-six lights of 600 candlepower each, or three and one-half times the candlepower under the old system. The system is the constant current series type with the George Cutter suburban post, Sollux, Jr., globe. The lamps are spaced 132 feet apart. The total cost of the system amounts to \$13,000.

